

October 21, 2004
Project No. J0285-03-01

Prepared For:

City of Northampton
210 Main Street, Room 11
Northampton, MA 01060

Attention: Mr. Wayne Feiden
Director of Planning and Development

**Historic Mill River Brownfields Site
Phase II Investigation Report
Northampton, Massachusetts**

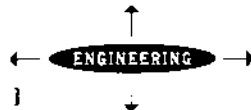
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Mr. Wayne Feiden
Director of Planning and Development
City of Northampton
210 Main Street, Room 11
Northampton, MA 01060

Re: Historic Mill River Brownfields Site
Phase II Investigation Report
Northampton, Massachusetts

Dear Mr. Feiden:

The attached report summarizes our Phase II Brownfields investigations of the historic Mill River corridor in Northampton, Massachusetts. This report was prepared on behalf of the City of Northampton per our December 17, 2002 contract.

Please contact us if you have any comments or questions regarding this document.

Very truly yours,
O'Reilly, Talbot & Okun Associates, Inc.

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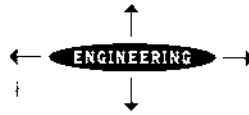
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1.0 INTRODUCTION

This report has been prepared by O'Reilly, Talbot & Okun Associates, Inc. (OTO) on behalf of the City of Northampton, under U.S. Environmental Protection Agency (EPA) Brownfields Pilot grant 02-36250.

The study area is a historic portion of the Mill River channel which is under consideration for redevelopment. The Mill River formerly flowed through the area, but was rerouted in approximately 1940 in response to severe flooding of downtown Northampton. The City is exploring the feasibility of reintroducing controlled stream flow through the corridor to provide visual appeal and promote economic development in the area. A site locus is provided as Figure 1. Figure 2 identifies the particular areas of the historic riverbed that were accessible for this study.

This project involved environmental assessment of soil, sediment and groundwater samples from the possible future streambed alignment, which is expected to roughly fall within the historic river channel. The focus of our activities was to identify conditions along the river alignment that may be reportable to the Massachusetts Department of Environmental Protection (MADEP) under the Massachusetts Contingency Plan (MCP), impacting cost or design of the redevelopment plans.

Our work was performed in accordance with our December 17, 2002 contract with the City of Northampton, the May 2003 Quality Assurance Project Plan (QAPP), and the September 2003 QAPP Addendum. This report is subject to the Limitations contained in Appendix A.

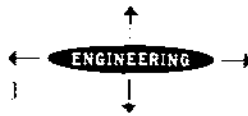
2.0 BACKGROUND

2.1 GENERAL SITE DESCRIPTION

The planned river reintroduction would span a distance of approximately 1.3 miles, flowing from the existing Mill River eastward towards Pleasant Street/Route 5. The overall study area is delineated on an aerial photograph provided as Figure 2. The study area passes through residential and commercial sections of Northampton. Our investigations took place in four specific portions of the riverbed which the City owns or was granted access to. These areas are identified on Figure 2 as Areas 1 through 4, which are described in the following sections. The formal study areas collectively span about half of the 1.3 mile distance. Some parcels along the future river route remain uninvestigated. The study areas are centered on the historic river channel and were not intended to investigate entire properties.

A storm water drain line was placed in the historic river channel following river diversion in approximately 1940. Storm water flow in Areas 2, 3 and 4 is directed to this line via storm drains. The drain line is culverted in 24 to 36 inch concrete pipe below Areas 2 and 3, then daylights east of Area 3. Open stream flow continues almost to Area 4, where flow is channelized below Pleasant Street. Stream flow daylighting on the east side of Pleasant Street is considered the Mill River, and flows in a southerly direction, ultimately discharging into the Connecticut River. The approximate location of the storm drain is depicted on Figures 3 through 6. It is shown in profile on Figure 7. Area 1 is undeveloped and does not contain storm drains. The water in this area appears to be somewhat stagnant, but with slow flow towards the east.

Photographs of the study areas are provided in Appendix B. A description of the physical features of each study area follows.



Area 1

Area 1 is the westernmost parcel in the study area, and is located at the head of the diverted section of river. This area is undeveloped, overgrown with vegetation, and contains a wetland/pond area. Ground surface rises steeply to the north and west, where the parcel is abutted by the Smith College Physical Plant, and residential and commercial structures, including a building formerly occupied by the National Felt Company. The Mill River and associated dike abut this parcel on the southwest. An unpaved road lies between the dike and the wetlands. Physical features and investigation locations in Area 1 are shown on Figure 3. Historic use of the surrounding area is discussed in Section 2.2.1.

Area 2

Area 2 includes the City-owned Veteran's Field ballpark and a portion of old riverbed that abuts a former rail bed. Area 2 features are shown on Figure 4 and on photographs in Appendix B. Granite retaining walls are located along the north side of the old river channel in this area, and an unpaved footpath runs parallel to the channel in the location of a historic rail bed. Current ground surface in the former river channel is approximately four to eight feet below the footpath elevation, and is heavily overgrown. North of the footpath, terrain slopes upwards towards West Street. The slope is covered in shrubs and weeds. An overhead electric easement is located along the northern edge of the channel.

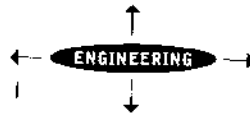
A concrete culvert was placed in the channel following diversion of the river, and runs the length of Area 2 (see Figure 4). Local storm water is directed to this culvert. The historic river corridor is overgrown with vegetation, and has received a significant amount of fill in some areas. As shown on Figure 7, up to ten feet of fill overlie the invert of the concrete drain line. The riverbed in Area 2 was predominantly dry during the period of our study, with some seasonal ponding of water in isolated areas.

A condominium building historically used for industrial purposes abuts Area 2 to the south, near Clark Avenue. Property use in this area is primarily residential. Historic use of the area, including the Clark Avenue Condominiums, is discussed in Section 2.2.2. Area 3 abuts Area 2 to the east.

Area 3

Area 3 is a paved, public parking area known as the Roundhouse Parking Lot, and is located in a commercial section of downtown Northampton. As shown on Figure 5, the historic river corridor runs along the southern edge of the parking lot. The low-lying channel is overgrown with weeds and bushes, and has seasonal wet areas. A chain link fence separates the southern edge of the old river corridor from the property to the south of Area 3.

This area is the subject of ongoing environmental investigations being conducted by Bay State Gas (BSG). Manufactured gas plant (MGP) wastes have been identified on this property, which formerly housed the Northampton Gas Works. Investigations are being conducted under the Massachusetts Contingency Plan (MCP). The site is identified by MADEP Release Tracking Number 1-14222. Because environmental studies were being conducted in this area by other parties, OTO did not conduct investigations in areas known to be associated with RTN 1-14222. A summary of investigations conducted by others in Area 3, and the nature and extent of impacted soil and groundwater relevant to the river restoration project are provided in Section 3.2.



Area 4

Area 4 is the easternmost study area within the historic river channel, and lies near the intersection of Pleasant Street and Hockanum Road. Area 4 is separated from the Area 3 by an approximately half-mile long section of historic riverbed that was not part of this study, primarily due to ownership and access considerations.

Physical features and investigation locations in Area 4 are shown on Figure 6. Area 4 is an undeveloped grassy area abutting Pleasant Street. Culverted stream flow daylight in this area on the east side of Pleasant Street, and is identified as the Mill River in this area. Flow is to the east, and is believed to be variable in intensity but constantly present in this area. Ground surface slopes steeply downward in the vicinity of the culvert outflow, dropping approximately 13 feet from street level. Land north of the river in Area 4 is owned by the Massachusetts Highway Department ("Mass Highway"); land south of the river and east of the Mass Highway parcel is likely owned by the City of Northampton, but ownership is uncertain at this time. Certain Area 4 investigations were also conducted on the west side of Pleasant Street, as shown on Figure 6.

Surrounding property use is residential and commercial. Railroad tracks are located approximately 150 feet east of Area 4, in the downstream direction. A wastewater treatment plant lies approximately 1000 feet southeast (downstream) of Area 4.

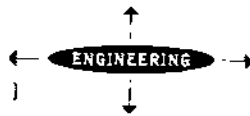
The Mass Highway owned portion of Area 4 is listed as an MCP release site due to the presence of polycyclic aromatic hydrocarbons (PAHs) in soil above MCP Reportable Concentrations, as discussed in Section 3.4. Mass Highway has filed a Downgradient Property Status Opinion for its property. MADEP tracks this parcel under RTN 1-14853.

2.1.1 Groundwater Resources

The study area is served by a municipal water supply system. No private supply wells have been identified within 500 feet of the study zone. Review of Massachusetts GIS mapping for the site and vicinity indicates portions of study areas 1 and 2 are located within a Current or Potential Drinking Water Source Area. The MCP defines Current or Potential Drinking Water Source Areas as areas:

1. Within a Potentially Productive Aquifer (PPA);
2. Within a Zone II or Interim Wellhead Protection Area for a public water supply;
3. Within the Zone A of a Class A surface water body used as a public water supply;
4. Within 500 feet of a private water supply well or greater than 500 feet from a public water supply distribution pipeline; or
5. Within a municipality designated aquifer protection area.

Medium yield aquifer underlies the entire study area; groundwater below Areas 3 and 4 has been classified as Non Potential Drinking Water Source Area. GIS mapping indicates portions of Areas 1 and 2 may be within potentially productive medium yield aquifer. Based on this information, the applicable groundwater reporting category would be RC-GW1 in Areas 1 and 2, and RC-GW2 in Areas 3 and 4. Our initial conclusions as to the applicable reporting classes for site soil and groundwater should be reviewed and confirmed if future site data is obtained indicating exceedances of reporting standards.



The ball field in Area 2 is classified as Protected Open Space. We also understand that the City has acquired portions of Area 1 for conservation purposes, which also should be considered Protected Open Space under future mapping. No areas of critical environmental concern or habitats for rare wetlands wildlife were identified within the study areas.

2.1.2 Hydrogeologic Setting

Mapping of fine-grained deposits in the area (USGS, 1979) indicates a silt and clay layer underlying the region is on the order of 50 feet thick in this area. This layer represents lacustrine deposits from glacial Lake Hitchcock. These fine-grained deposits were not fully penetrated for this study.

The bedrock geology map for the Commonwealth of Massachusetts (USGS, 1983) indicates the Site is underlain by locally conglomeratic arkose interbedded with brick-red shaley siltstone and fine-grained arkosic sandstone (USGS, 1983). Bedrock was not encountered during these investigations. Activities related to future reintroduction of stream flow to the river bed would likely involve overburden materials only.

2.2 HISTORICAL SITE USE

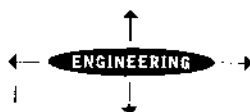
This section provides a summary of history of use for each of the four study areas. This information was obtained from a review of prior Site reports (T&B, 2002a; W&C, 2002a), historic maps, Sanborn Atlases, street directories, and other documents available at the Forbes Library in Northampton. Our review of site history focused on identification of possible contamination sources, such as activities which may have used or generated oil or hazardous materials.

2.2.1 Area 1 Use History

Area 1 is a low-lying wetlands area that is currently undeveloped, but is abutted on the north and west by the renovated historic Felt Building, the Smith College Physical Plant, and the Massachusetts Electric Company West Street Substation. Two transformer yards are located approximately 300 to 400 feet west of the former river channel in this area, as shown on Figure 3.

The Felt Building, located at 136 West Street, currently houses a dance studio, office space for Healthcommunities.com, and other tenants. The main building at this location appears to have been built in approximately 1899, and was occupied by the McCallum Hosiery Company from approximately 1899 through 1952. Historic Sanborn Atlases indicate this company was a silk hosiery manufacturer. A dyeing operation is shown on the south side of the building in 1910 and 1915 Sanborn maps. Significant additions to the building were made over time, and the location of the dyeing operation appears to have changed at least twice. Street directories indicate the Milford Wool Hat Body Company, the Commonwealth Felt Company and/or the National Felt Company were located in this building from approximately 1956 through at least 1983. The building was vacant for a period before being redeveloped for its current use as office space.

The Northampton Electric Lighting Company and an associated coal shed are shown on Sanborn Atlases from 1895 (the earliest date available) through 1930. The buildings were subsequently occupied by the Smith College Physical Plant, which appears to have been built in 1947. Sanborn Atlases show underground storage tanks (USTs) on the southwest side of the plant in 1950.



Northampton Fire Department records indicate five USTs were removed from Smith College property on West Street between 1987 and 2002, and one was removed from the Felt Building property in 1999. Information available in the Fire Department records was as follows:

Address	Owner	Capacity & Contents	Date Removed
West Street	Smith College	1,000 gallon gasoline	3/27/87
West Street	Smith College	5,000 gallon gasoline	5/30/96
West Street	Smith College	2,000 gallon diesel	5/31/96
West Street	Smith College	30,000 gallon No. 6 oil	6/30/97
West Street	Smith College	275 gallon virgin motor oil	6/14/02
136 West Street	Felt Building	10,000 gallon fuel oil	10/18/99

The exact locations of these former tanks are not identifiable from Fire Department records, and may not have been at the Physical Plant. No indication of tank condition upon their removal was noted in Fire Department. One existing 3,000 gallon gasoline/diesel UST is believed to remain in-place on Smith College property. MADEP records indicate the 2,000 gallon and 5,000 gallon tanks removed in 1996 were on Smith College Physical Plant property. Gasoline-impacted soil and groundwater were encountered during their removal. That release was closed with a Class A-2 RAO in 1997.

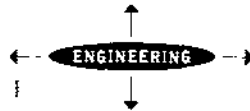
Based on site use history, the constituents identified as potentially of concern in Area 1 include petroleum hydrocarbons from oil and gasoline, PCBs from transformers, mercury from felt manufacture, and other heavy metals potentially used in dyeing operations. Due to the proximity of the former river channel, these constituents have the potential to be present in former river sediments.

2.2.2 Area 2 Use History

Area 2 includes a recreational area known as Veteran's Field and a length of former riverbed that runs parallel to an unpaved pedestrian walkway (see Figure 4). The walkway was placed in the location of former railroad tracks that historically ran parallel to the river in this area. Ground surface in the former riverbed is approximately four to eight feet below the walkway elevation. The channel appears to have received significant amounts of fill over time, including soil, organic matter, and trash.

Veteran's field includes a grassed baseball diamond, a paved basketball court, and an unpaved parking area. The only building currently within the Area 2 study zone is a small utility building that provides restrooms and changing rooms for recreational users of the field.

The Clark Avenue condominium building at 53 to 55 Clark Avenue abuts a portion of Area 2 on the south. This building is believed to have been constructed in the late 1800s, and was used for industrial and commercial purposes through the 1970s. The building was converted to residential condominiums in 1988. The Sanborn Atlas dated 1884 shows a grist mill and a wire manufacturer, including drawing and pickling operations, in this building. The mill operations were water powered. The Mill River appears to have been diverted below the building by way of a dam at that time. The 1910 through 1930 Sanborn maps show an iron bridge crossing the river from the central portion of the manufacturing building to the rail bed on the opposite side. This bridge is no longer present in the 1965 Sanborn map. Visual evidence of the footings remains in the old river



channel. Later occupants of the building included a talc company, a hat company, a hosiery manufacturer, a cardboard box factory, and an optical lens manufacturer. More recent tenants (1950s through 1970s) have included Northampton Intertyping Company, Lerma Engineering Corporation and Metcalf Publishing and Printing.

Based on the history of use in Area 2, the constituents identified as potentially of concern in this portion of the study area were petroleum hydrocarbons from oils, PAHs and PCBs associated with rail activity, and heavy metals.

2.2.3 Area 3 Use History

Area 3 was formerly occupied by the Northampton Gas Light Company Gas Works, a coal gasification plant. The plant provided gas for city streetlights, among other uses. The manufactured gas plant (MGP) was present from approximately 1856 to 1951. Most of the above-grade structures associated with the plant were demolished in 1962; some subsurface structures remain.

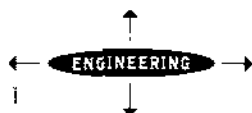
A portion of the former MGP property was transferred to City ownership in 1973, and redeveloped as a paved parking lot. Two MGP buildings remain on an adjacent, privately owned parcel: a former gasholder known as the Roundhouse, and an associated brick building which was formerly a purifier house. Both buildings were redeveloped for commercial purposes by a private owner, and are currently used for office space.

Soil and groundwater below Area 3 are known to be impacted by MGP waste, including volatile and semi volatile organic compounds and cyanide. Bay State Gas is currently conducting environmental studies in this area, including investigating the possible presence of subsurface structures formerly associated with the plant. Because this area is being investigated by others, it was not included in our investigations. However, reports and analytical data generated for the property have been reviewed to evaluate the possibility of significant impacts on the future waterway. A summary of this work is presented in Section 3.2.

2.2.4 Area 4 Use History

Area 4 is a currently undeveloped area abutted by Hockanum Street to the north, Pleasant Street to the west, and Wright Avenue to the south. Sanborn Atlases indicate that the street configuration in this area has changed over time. In 1915, Pleasant Street did not extend as far south as Area 4, but terminated at Hockanum Street, which was then known as Meadow Street. Wright Avenue extended further north, merging with Pleasant Street, and incorporated an iron bridge that crossed the Mill River. The river was shown to be about 80 feet wide in this area in 1915. The iron bridge and portions of Wright Avenue were later removed, and the 1930 Sanborn Atlas shows Pleasant Street had been extended and straightened into its current north-south configuration.

The Sanborn Atlases reviewed for this study did not show any buildings on this parcel. It appears that Area 4 may have historically underlain portions of Wright Avenue and/or the former iron bridge. Development on abutting parcels included a former coal company to the north, railroad tracks to the east, and residences to the south. Previous investigations conducted in Area 4 by others are described in Section 3.4; OTO investigations in this area are summarized in Section 5.4.



3.0 PRIOR REPORTS FOR STUDY AREAS

Existing reports for several sites within and near the historic Mill River corridor study areas were reviewed. Information from the following reports is summarized in Section 3.0:

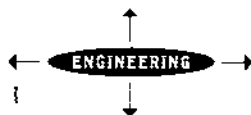
- A Phase I Environmental Site Assessment prepared for the historic Mill River corridor (T&B, 2002a);
- A Targeted Brownfields Assessment prepared for the Roundhouse Parking Lot (Area 3) which abuts and includes a portion of the corridor (M&E, 2002);
- An MCP Phase I/Tier Classification submittal for the Former Northampton Gas Works (W&C, 2002a);
- An Immediate Response Action Completion Report for the Former Northampton Gas Works site (W&C, 2002b);
- A Response Action Outcome Statement for the Millbank Apartments located at 18-79 Michelman Avenue (OTO, 2001); and
- A Phase I environmental site assessment report prepared for Area 4 (T&B, 2002b).

Response actions described in these reports are summarized below. Applicable data from the referenced reports (analytical tables, boring and well installation logs, and site plans) are provided in Appendix C.

3.1 HISTORIC MILL RIVER CORRIDOR – PHASE I REPORT (2002)

Tighe and Bond (T&B) prepared a Phase I Environmental Site Assessment (T&B, 2002a) of the river corridor from the westernmost point of the river divergence near West Street, through the downtown area of Northampton to the railroad crossing at the east end of Pleasant Street. T&B personnel reviewed existing documentation of the site area including files at the DEP, flood insurance maps, and USGS maps. According to T&B, no reportable releases occurred in the study area. They discovered 18 MADEP-listed disposal sites located within one-quarter mile of the study area. Of these, T&B identified two releases considered to have the potential to impact the Mill River study area:

- a. Multi-family dwelling, 54 West Street (RTN 1-12086). This site is located 0.02 miles northwest of the historic Mill River corridor, near Area 2. A No. 2 fuel oil release was discovered during removal of a 1,000 gallon UST from this property in 1997. The UST installation permit had been issued in 1934. A total of 255 tons of impacted soil was excavated, although residual petroleum remains in soil. Groundwater did not appear to be impacted. A Class A-2 Response Action Outcome was submitted to MADEP in June 1998, stating that residual petroleum contamination exists in certain soils on-site at depths greater than four feet. Given its proximity to the river corridor and the potential for long-term release of fuel oil, this site was identified as posing a potential threat of impact to study area.
- b. 18 to 79 Michelman Avenue (RTN 1-13844). This property abuts the historic Mill River approximately 600 feet northwest (upstream) of Area 4. High concentrations of lead were detected in soils at this site at depths of up to 20 feet below grade. Groundwater at the Michelman Avenue site was determined to flow towards the Mill River bed, but was not found to contain significant concentrations of lead. It was



determined to be infeasible to achieve background concentrations of lead in the soil, and the site was closed out as a Class A-3 RAO, with an AUL on the property. Based on the presence of lead impacted fill and proximity to the historic riverbed, this release was considered to pose a potential threat of impact to the study area. This site is discussed further in Section 3.3; investigations conducted in this vicinity for the current study are discussed in Section 5.4.

As part of their Phase I study, T&B performed three soil borings on the Area 4 property owned by the Massachusetts Highway Department. T&B boring locations MW-1, MW-2 and MW-3 are shown on Figure 6. T&B's investigations in this area were presented in two reports prepared concurrently, which contain redundant information on Area 4. Their investigations are summarized in Section 3.4. T&B concluded that soils in Area 4 had been impacted by reportable concentrations of PAHs, but groundwater had not.

T&B's Phase I report recommended more detailed subsurface investigations with sampling for volatile and extractable petroleum hydrocarbons (VPH/EPH) and metals along the historic Mill River corridor to determine if the corridor has been impacted by reportable releases of oil or hazardous materials. Further testing was conducted in this area by OTO, as described in Section 5.4.

3.2 AREA 3 – FORMER NORTHAMPTON GAS WORKS

The Former Northampton Gas Works site was the location of a coal gasification plant from approximately 1856 to 1951. The Former Northampton Gas Works site is shown on Figure 5. Reports available for the Former Northampton Gas Works Site include a Targeted Brownfields Assessment (M&E, 2002), a Tier Classification submittal including MCP Phase I report (W&C, 2002a), an Immediate Response Action Completion Report (W&C, 2002b).

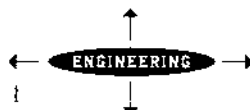
3.2.1 Targeted Brownfields Assessment (2002)

In January 2002, Metcalf and Eddy prepared a Targeted Brownfields Assessment of the Roundhouse Parking Lot under a Response Action Contract with EPA. M&E's study included:

- 31 direct push borings with soil sampling to depths of up to 16 feet below grade;
- 9 hollow stem auger borings to depths of 14 to 25 feet;
- Installation of five groundwater monitoring wells;
- Analysis of soil and groundwater samples; and
- A soil gas survey including 19 samples.

M&E observed fill to depths of 16 feet, underlain by native sands and gravels. Fill materials included brick, concrete, coal, shell fragments, ash and clinkers. Field evidence of impact in soil borings was noted, including staining, creosote and naphthalene odor, fuel oil odors and elevated photoionization detector (PID) headspace readings (greater than 2000 ppm). Separate phase tar and/or oil were observed in some soil samples.

Soil samples from the 31 direct push Geoprobe borings were screened for volatile organic compounds in the field with a PID, but were not submitted for laboratory analysis. One to two soil samples from each of the nine hollow stem auger borings was analyzed for EPH, VPH, metals



and cyanide. M&E's analytical data tables are provided in Appendix C. EPH and VPH hydrocarbons, VOCs, PAHs, metals, and cyanide were detected in soil samples, consistent with past use of the property as a manufactured gas plant. Concentrations of aromatic hydrocarbons, benzene, naphthalene, and other PAHs in soils exceeded applicable reportable concentrations (RCs) at depths ranging from 5 to 17 feet below grade.

Groundwater samples were collected from the five monitoring wells (identified as MW-2, MW-4, MW-6, MW-7 and MW-8 on Figure 5). M&E's groundwater analytical data tables are provided in Appendix C. Several metals and total cyanide were detected in each groundwater samples. Naphthalene was detected in each sample. EPH and/or VPH hydrocarbons were detected in groundwater from wells MW-4, MW-6, MW-7 and MW-8. Concentrations in well MW-6 exceeded RCs for VPH hydrocarbons, naphthalene and phenanthrene. Cyanide concentrations exceeded RCs in groundwater samples from four of the five monitoring wells.

EPA collected soil gas samples from City-owned portions of the Roundhouse area parking lot in December 2001. Their study is included as an appendix to the M&E report. The sampling was performed near the occupied buildings on the eastern portion of the site. Low levels of VOCs were detected (petroleum related, chlorinated, and chlorofluorocarbons), however a human health risk screening indicated there was no significant risk of harm via the air pathway under current or future foreseeable conditions. EPA's soil gas data tables are provided in Appendix C.

In summary, the M&E Targeted Brownfields Assessment identified manufactured gas plant (MGP) waste constituents in soil and groundwater above applicable MADEP Reportable Concentrations. MADEP was notified, and issued RTN 1-14222 to the site.

3.2.2 Tier Classification Submittal (2002)

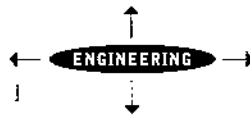
A Tier Classification Submittal for the Former Northampton Gas Works (RTN 1-14222) was prepared by Woodard & Curran (W&C 2002a) on behalf of Bay State Gas. This document included an MCP Phase I report, Numerical Ranking System (NRS) score sheets, Tier Classification forms and a conceptual Phase II Scope of Work. The Phase I report relied upon data collected during the Brownfield's assessment (M&E, 2002).

The former gas works was classified as an MCP Tier II site. The conceptual scope of work indicated additional soil and groundwater sampling would be conducted to identify the extent of impact from MGP wastes. Possible performance of a soil gas survey was indicated if future data suggested possible risks to receptors in nearby buildings.

3.2.3 IRA Completion Report (2002)

An Immediate Response Action (IRA) Completion Report was prepared for the Roundhouse site by W&C in December 2002 (W&C, 2002b). The discovery of five inches of dense nonaqueous phase liquid (DNAPL) in monitoring well MW-8 in October 2002 triggered Immediate Response Actions (IRA) under the MCP.

The IRA consisted of assessment work. The DNAPL, which was reported to be black and have a naphthalene odor, was purged from the well. DNAPL appeared to drain slowly into the well during purging.



The report concluded that there was no Imminent Hazard to health, safety, welfare or the environment. This conclusion was based partially on the fact that there were no aquatic environmental receptors proximate to the site, a condition which would change if the river were reintroduced to the area in the future.

3.2.4 Preliminary Phase II Activities (2003-2004)

MCP Phase II investigations are currently on-going at the Former Northampton Gas Works Site. BSG has provided analytical data and updates on work progress to the City and OTO during 2003 and 2004. However, this information is considered preliminary until it has been documented in a formal submittal to MADEP, and is therefore not presented in detail here.

OTO has been provided boring logs for approximately 50 borings performed by W&C for the Former Northampton Gas Works Site. Visual observation of soils from borings indicates oily globules, presumed to be coal tar, are present below much of the site. The oil has a naphthalene/coal tar odor, and is associated with an elevated PID response. The separate phase liquid appears to be located primarily at depths of 12 to 20 feet below grade.

Based on investigations conducted in 2003 and 2004, the study area has been expanded to include Northampton Housing Authority property to the south (across the historic Mill River bed) and to the east, into the Old South Street Parking Lot.

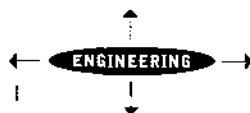
We believe the former gas works site has the potential to significantly impact the river reintroduction project, based on the nature and extent of constituents identified in environmental media. Coal tar is known to be present in the vicinity of the riverbed, and has the potential to slowly migrate into a future river channel. This could adversely affect environmental receptors, as well as provide a migration pathway for MGP wastes. Impacts may be minimized by modifications to channel design, such as inclusion of an impervious liner, in this area.

3.3 18 TO 79 MICHELMAN AVENUE (2001)

A Response Action Outcome (RAO) is available in MADEP files for the proposed (now existing) Millbank Apartments at 18-79 Michelman Avenue (OTO; 2001). During preconstruction investigations in November 2000, elevated lead levels were identified in soil at the site. The Millbank Apartments lie approximately 480 feet northwest of Area 4, and are abutted by the historic Mill River channel. A low volume of stream flow exists in the current channel, which becomes culverted below Route 5, and daylights again in Area 4 (see Figure 6).

The lead detected at the Millbank Apartments site appeared to be associated with fill materials in the unsaturated zone. Lead was not detected in groundwater at the site. A condition of No Significant Risk was determined to be present, and a Class B-1 RAO statement was filed for the lead in soil condition.

Boring logs from portions of the property closest to the riverbed had a coal tar like odor reported at depths of 5 to 19 feet below grade. This is consistent with the naphthalene odor observed in the streambed area near OTO hand boring 4H-6 (see Section 4.4.3).



3.4 AREA 4 – PHASE I ASSESSMENT (2002)

Reports available for Area 4 include a Phase I Environmental Site Assessment completed in 2002 and a Downgradient Property Status Opinion filed with MADEP in 2004. These reports are discussed below.

3.4.1 Phase I Site Assessment (2002)

Tighe and Bond (T&B) prepared a report entitled “Phase I Environmental Site Assessment: Intersection of Pleasant Street and Hockanum Road, Northampton, Massachusetts” for the two undeveloped parcels of land that comprise Area 4 (T&B, 2002b). This report was prepared concurrently with the Phase I report for the river corridor described in Section 3.1, which includes redundant information.

The Phase I assessment was prepared on behalf of the City of Northampton and included:

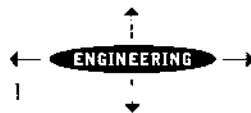
- A site reconnaissance;
- A review of local, state and federal records related to site use and history;
- Installation of three groundwater monitoring wells; and
- Soil and groundwater analyses.

T&B conducted three soil borings in Area 4. Each boring was completed as a groundwater monitoring well; locations are shown on Figure 6 as MW-1, MW-2 and MW-3. Soil samples from the three borings were screened for total petroleum hydrocarbons using PetroFlag kits. Based on the results, one sample from each boring was selected for laboratory analysis of EPH and VPH with target analytes. Soil data are summarized on Table 1. Low levels of EPH hydrocarbons were reported in each of the soils. VPH was not detected in the three samples. Four carcinogenic PAHs were detected above RCs in the soil sample from location MW-2, 15 to 17 feet below grade, as shown on Table 1. These constituents were benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene and indeno(1,2,3-c,d)pyrene, which are sometimes associated with the presence of coal ash or wood ash. The soil sample (MW-2, 15-17 feet), was submitted for microscopic analysis. Coal, coal ash and wood ash were not found in the sample, but the presence of light to moderate tar derivatives was identified.

Groundwater samples from the three wells were collected and analyzed for EPH, VPH and RCRA-8 metals. As shown on Table 2, groundwater did not contain concentrations in excess of applicable Reportable Concentrations. T&B determined that groundwater flows in an easterly direction in Area 4. They concluded that soils in Area 4 had been impacted by PAHs, but groundwater has not. T&B recommended more detailed surface investigations with sampling for EPH/VPH and metals along the historic Mill River corridor to determine if the corridor has been impacted by reportable releases of OHM from historic and current adjacent uses.

3.4.2 Downgradient Property Status Opinion (2004)

A Downgradient Property Status (DPS) Opinion for the Pleasant Street/Hockanum Road property was filed by Fuss & O'Neill, Inc. (F&O, 2004) on behalf of the Massachusetts Highway Department in May 2004. F&O relied upon data generated by T&B and OTO. The DPS Opinion was based on the presence of PAHs in soil within the historic river channel, at depths of 16 to 18



feet below grade, believed to correspond to the historic riverbed. Additionally, black particles that released a naphthalene odor were observed in material from this depth. Microscopic analyses performed for T&B and OTO were consistent with coal tar. Impacts were not identified in soils from outside the lateral limits of the former river, or in shallower fill materials, therefore the materials are believed to have come to be located on site via historic stream flow within the river. OTO's investigations in this area are discussed in further detail in Section 5.4.

4.0 OTO ASSESSMENT ACTIVITIES

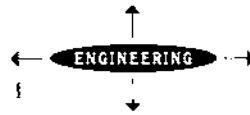
This section describes activities and methodologies used during OTO field investigations. Results generated by these activities are discussed in Section 5.0.

OTO conducted studies to evaluate the nature and extent of impacted soils and groundwater in Areas 1, 2, and 4 of the historic riverbed. Limited work was conducted adjacent to Area 3 due to the exploration of that area by others as discussed in Section 3.2.4. Our work focused on identifying potentially reportable conditions that may be encountered during future work in the historic riverbed as part of stream flow reintroduction. This work included the collection and analysis of soil and groundwater samples for multiple analytical parameters.

Exploration locations are shown on Figures 3 through 6. Locations were assigned identifiers that incorporate information about the sample location and type. The first number of each exploration indicates which area of the channel it was collected from (for instance, borings in Area 4 begin with "4"). The second code is a letter which indicates whether the exploration was a hollow stem auger soil boring (B), hand augered boring (H), track mounted Geoprobe soil boring (T) or monitoring well (W) location. The digit(s) at the end of the identifiers were assigned sequentially. Table 3 provides a summary of the number and type of explorations conducted in each area, and their identifiers.

A total of 49 soil borings were performed for this study. Thirty-one of these borings were performed manually with hand augers and/or shovels, three were conducted using a track-mounted Geoprobe rig, and fifteen were performed with a hollow stem auger drill rig. Explorations were performed by hand in locations inaccessible to drill rigs due to soft, wet ground, sloping terrain, or vegetative overgrowth. Regardless of methodology used, the purpose of the soil borings was to collect samples representative of materials that would likely be excavated during reintroduction of flow to the river channel. The borings were spaced to provide lateral coverage along and proximate to the former river channel, with borings somewhat more closely spaced in the vicinity of former industrial operations in Area 2. In some areas, borings were conducted outside the channel limits shown on the site plans. This was done due to access limitations, or because of uncertainty as to the final alignment of the future construction, or to evaluate background conditions outside the channel.

Materials encountered were primarily fill, a large amount of which is considered likely to have been deposited in the dry channel following diversion of the river in approximately 1940. Some explorations extended into materials interpreted as native riverbed deposits based on depth and visual observation. Bedrock was not encountered during these investigations. The materials encountered in each boring are documented on the logs provided in Appendix D. A Thermo Environmental Instruments model 580B PID equipped with a 10.2 eV lamp was used to screen the headspace of each soil sample collected. PID screening results are included in the boring logs, which also include visual and olfactory observations.



Selected soil samples from the borings were submitted for laboratory analysis; analytical results are discussed in Section 5.0. Soil samples selected for analysis were in some instances based on field observations (such as sheen, odor, or PID reading). In other cases a sample was composited from the ground surface to the estimated depth of excavation required for channel reintroduction in that area, to evaluate overall soil conditions.

Groundwater samples were collected from the site monitoring wells on various dates between July 15 and December 18, 2003. Groundwater analytical results are summarized on Table 4, and are discussed in Section 5.0. Further information on sample collection and analysis in each area is provided below.

4.1 AREA 1 INVESTIGATIONS

Investigations in Area 1 included five hand borings, two of which were completed as groundwater monitoring wells.

4.1.1 Hand Borings

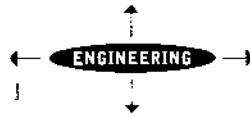
Area 1 was inaccessible to a drill rig due to soft wetland ground and vegetative overgrowth. Investigations in this area were therefore performed manually. The locations of the five hand borings performed in Area 1 are shown on Figure 3. Four of these five borings were located near an existing surface water body, and encountered fine brown organic sediments that appeared to be native. The water table was shallow in this area, and was encountered within one foot of ground surface. Boring 1H-4 was performed near an old access road at higher elevation, and encountered dense sandy fill material. The hand boring at location 1H-4 could not be advanced to the water table despite several attempts at different locations.

Soil samples from these borings were screened in the field for total volatile organic compounds (VOCs) using a photoionization detector (PID). No detectable VOCs were present in the soils from Area 1. Soil samples were submitted to AMRO Environmental Laboratory of Merrimack, New Hampshire for analyses including EPH, semi volatile organic compounds, PCBs, pesticides, metals and/or cyanide. Analytical results are discussed in Section 5.1.

A monitoring well was installed at location 1H-1 by manually driving a length of slotted steel pipe into a hand-augered borehole. However, due to the fine grained sediments at this location, the well point produced slurry-like water that was too silty for analytical purposes, particularly for inorganic analytes. A second manually placed well was therefore installed in Area 1 at location 1H-5, using a shovel to open up a hole large enough to accommodate a sand pack around the well screen. This method resulted in a monitoring point that was usable for groundwater sample collection.

4.1.2 Groundwater Monitoring

Groundwater samples were collected from Area 1 using low flow purging and sample collection methodologies. Groundwater sample collection logs are provided in Appendix E. A peristaltic pump was used to purge water at a flow rate low enough to minimize water table draw-down within the well. The purge water was monitored with field instruments for pH, specific conductance, temperature, turbidity and/or dissolved oxygen. Water was purged until field measurements had stabilized, at which point a sample was collected for analysis.



As described above, wellpoint 1H-1 produced a groundwater sample too silty for analytical purposes. The presence of entrained sediment in groundwater samples can produce high-biased analytical data, therefore this wellpoint was not used. Wellpoint 1H-5 produced a groundwater sample of acceptable turbidity, and was sampled on September 30, 2003 using low flow methods. Analytical results are discussed in Section 5.1.

4.2 AREA 2 INVESTIGATIONS

Investigations in Area 2 included twenty soil borings performed by various methods. Seven of these borings were completed as groundwater monitoring wells.

Each of the soil samples collected during these investigations was screened in the field for total volatile organic compound (VOC) content using a PID. No measurable levels of VOCs were recorded in Area 2 soils.

One soil sample from each boring was submitted to AMRO for analysis of a suite of parameters including EPH, semi volatile organic compounds, PCBs, pesticides, metals and/or cyanide. Analytical results are discussed in Section 5.2.

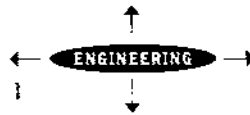
4.2.1 Hand Borings

Eight hand borings, identified as 2H-1 through 2H-8, were conducted in the low-lying channel that parallels the footpath in Area 2 (see Figure 4). The ground slope and heavy overgrowth limited rig access in this area. There was no standing water in this portion of the riverbed during our studies. Materials encountered in this area appeared to be fill to the maximum depth achieved (six feet). Groundwater was present at four to six feet below grade. Refusal was frequently encountered in Area 2 hand borings, causing some explorations to be relocated up to five times. In addition to the sandy fill materials present, larger diameter materials such as concrete rubble were present, possibly from the former bridge and water power dam historically located near the Clark Avenue condominiums. Because of the difficulty advancing hand borings in Area 2, manually placed monitoring wells were not successful in that area. A track-mounted Geoprobe rig was therefore used to access portions of Area 2 for monitoring well placement.

4.2.2 Geoprobe Borings

A track-mounted direct-push Geoprobe rig was used to perform three borings (2T-1, 2T-2 and 2T-3) along the linear portion of Area 2. Hand borings in this area had not been successful at reaching the desired depths due to repeated shallow refusal. Geoprobe borings were advanced to depths of 8 to 20 feet below grade. Materials encountered consisted of fill to approximately ten feet below grade; silt and sand deposits interpreted as natural underlie the fill. The water table was encountered at approximately elevation 110 feet in this area (see Figure 7).

One-inch diameter groundwater monitoring wells were placed in each of the Geoprobe borings. As shown on the boring logs in Appendix D, silica sand was placed in the borehole annulus around the well screen as a filter pack. Bentonite was placed above the sand pack to seal the borehole from rainwater or other surficial drainage. Each of these monitoring wells was finished with a protective steel standpipe.



4.2.3 Hollow Stem Auger Borings

Eight borings were performed by hollow stem auger drilling in Area 2, primarily around Veteran's Field, which was accessible to the drill rig. The borings were completed by Seaboard Environmental Drilling (Seaboard) of Chicopee, Massachusetts. Soil samples were collected continuously from the ground surface to the maximum borehole depth using a two-foot long split spoon sampler. Boring logs are provided in Appendix D.

Boring depths were based on the estimated thickness of soil that would require removal during river reintroduction. Around Veteran's Field, borings were advanced to six to twelve feet below grade. Materials encountered in this area included a layer of topsoil underlain by silt and sand. Soils from borings 2B-11, 2B-12, 2B-13 and 2B-14 each contained coal, primarily in the upper two feet. No PID headspace readings above background were recorded for Area 2 soils.

Two of the borings in Area 2 were completed as groundwater monitoring wells (2W-9 and 2W-16). The wells were constructed of two-inch diameter PVC well screen set to span the water table. A bentonite seal was placed above the sand pack, and the remaining annulus backfilled with auger cuttings. Details of monitoring well construction are presented in the boring logs attached in Appendix D. Groundwater was present at three to five feet below grade around Veteran's Field.

4.2.4 Groundwater Monitoring

Groundwater samples were collected from Area 2 using low flow methods on several dates. However, during one groundwater sampling round (August 12, 2003) groundwater samples were collected using conventional bailer sampling methodologies. This sampling was done to further evaluate elevated lead and mercury levels that had been reported in groundwater from monitoring wells 2W-9 and 4W-1 in July 2003 (see discussion of analytical results in Section 5.2). The lead results were considered suspect due to sediment in the samples, despite the use of low flow methods in July. Bailing was considered a more effective way to remove silt from the wells. A minimum of three times the volume of standing water in each monitoring well was purged prior to groundwater sampling with bailers.

The groundwater samples were submitted to AMRO Laboratory of Merrimack, New Hampshire for analysis in accordance with the QAPP. In October 2003, selected duplicate samples were submitted to a second laboratory, Spectrum Analytical of Agawam, Massachusetts, for quality control purposes. Groundwater sample collection logs are provided in Appendix E.

4.3 AREA 3 INVESTIGATIONS

OTO did not perform subsurface investigations within areas known to be associated with the Northampton Gas Works Site due to on-going study being performed by others on behalf of Bay State Gas. OTO performed two borings in the Old South Street Parking Lot, east of Area 3, to evaluate soil and groundwater conditions downgradient of the that site. OTO also observed one boring performed by W&C in the Roundhouse Parking Lot, and collected a soil sample from that boring (WG-30) for laboratory analysis. Fifteen shallow hand borings were conducted in the stream bed east of Area 3. Investigation locations in the vicinity of Area 3 are shown on Figure 5 and are described below.

4.3.1 Hollow Stem Auger Borings

Two borings (3W-1 and 3W-2) were performed in the Old South Street Parking Lot on September 18, 2003. Both borings were completed as monitoring wells. The borings were performed by Seaboard using hollow stem auger techniques. Soil samples were collected continuously from the ground surface to the maximum borehole depth using a two-foot long split spoon sampler. Boring logs are provided in Appendix D.

The two borings in this area were advanced to 18 to 22 feet below grade. Groundwater was encountered at approximately 11 to 12 feet below grade. Soils from boring 3W-1 appeared to be fill to the maximum depth attained (18 feet). Fill materials in that boring included what appeared to be asphalt and coal slag at a depth of 5 to 8 feet below grade, and wood and brick fragments in deeper soils. PID headspace measurements were nondetect for soils from boring 3W-1.

Soils from location 3W-2 exhibited signs of MGP waste, including naphthalene odor and/or the presence of black oily material, at depths of 11 to 21 feet below grade. Soils from this boring had PID headspace measurements up to 13.5 ppm. Boring 3W-2 is believed to lie within the historic river channel.

To evaluate the different fill materials encountered, two soil samples from different depths in each boring were submitted for a suite of laboratory analyses. One sample from boring 3W-1 was also submitted as a blind duplicate for quality control purposes. Analytical results are discussed in Section 5.3.

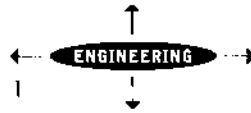
4.3.2 Observation of Boring WC-30

OTO observed the advancement of soil boring WC-30 on October 13, 2003. That boring was performed by Woodard & Curran for Bay State Gas. WC-30 was located near the entrance to the Roundhouse Parking Lot, as shown on Figure 5.

Boring WC-30 was advanced to a depth of 26 feet below grade. Soil samples collected from 22 to 26 feet below grade had PID headspace measurements over 200 ppm. A coal gas type odor and tar-like globules were observed at approximately 23.5 feet below grade. The odor appeared similar to but stronger than that observed in soils at location 3W-2. OTO collected a sample of material from the 22 to 24 foot interval of boring WC-30 for laboratory analysis. Analytical results are discussed in Section 5.3. W&C did not collect samples for laboratory analysis from this boring. The boring was backfilled and was not completed as a monitoring well.

4.3.3 Groundwater Monitoring

Groundwater samples were collected from monitoring wells 3W-1 and 3W-2 on September 30, 2003. A blind duplicate of sample 3W-1 was collected for quality control purposes. Well 3W-1 was resampled on October 21, 2003 for physiologically available cyanide analysis, in response to detection of total cyanide above applicable Reportable Concentrations (see discussion of analytical results in Section 5.3). Low flow sampling methodologies were used on each date. During low flow sampling, a peristaltic pump was used to remove water at a rate low enough to minimize drawdown in the well, while monitoring groundwater chemistry through the use of portable pH, conductance, temperature and turbidity meters. A groundwater sample is collected when field measurements have stabilized, indicating groundwater representative of the aquifer is being



withdrawn. This method limits disturbance of the aquifer and is supported by MADEP and EPA. Copies of groundwater sampling records are provided in Appendix E.

4.3.4 Soil Borings in Stream Bed

OTO performed 15 shallow soil borings in the existing stream bed east of the Old South Street Parking Lot, as shown on Figure 5. Stream bed samples were numbered SB-1 through SB-9. At each of three locations (SB-1 through SB-3) three samples (labeled A, B and C) were collected in a transect from the center of the stream to the northern bank. The City property line bisects the stream; therefore, samples were not collected from the southern half of the streambed.

These borings were performed manually using a stainless steel hand auger to the maximum depth achievable, based on borehole collapse or auger refusal. Depths of one to five feet below grade were achieved. Table 5 provides a summary of depths, materials encountered and observations for the stream bed hand borings. Materials encountered were typical of stream beds at most locations, consisting of sand, silt and organic deposits. Coal, slag and a petroleum-type hydrocarbon odor were noted in samples from SB-2 and SB-3 from approximately one to two feet below grade. This material did not produce a sheen on the water. Historically, a railroad track ran parallel to the river in this area, and may be the source of coal and slag. The hydrocarbon odor may be due to an upgradient source and/or parking lot outwash. The material appeared to be localized in extent, and does not appear to present a reportable condition. Reportable Concentrations for soil are not applicable to sediments.

Soil from a depth of 4 to 5 feet below grade at location SB-7 had a black appearance and naphthalene odor. Based on its proximity to the Old South Street Parking Lot, where borings by OTO and W&C have identified material likely to be coal tar, a sample of this material was submitted for laboratory analysis. Analytical data for sample SB-7 are discussed in Section 5.3.1. The extent of this material could not be delineated by these hand borings due to their shallow depths. Most of the hand borings could not be advanced more than two feet below grade due to borehole collapse in the wet materials.

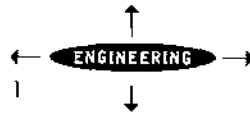
4.4 AREA 4 INVESTIGATIONS

Investigations performed by OTO in Area 4 included five hollow stem auger borings and two hand borings. Three of the borings were completed as groundwater monitoring wells. Based on analytical results for initial testing in this area, two of the borings were conducted on the west side of Pleasant Street, which was not originally included as part of Area 4, to provide additional information on conditions in the area.

4.4.1 Hollow Stem Auger Borings

Five soil borings were performed by hollow stem augers in Area 4. As shown on Figure 6, four of these (4B-1, 4B-2, 4B-3 and 4W-1) are located immediately east of Pleasant Street. The fifth is located near Millbank Place, west of Pleasant Street. The three boring/monitoring wells performed in this area by Tighe & Bond are also shown on Figure 6.

Fill materials were identified in soil samples collected from borings 4B-1, 4W-1 and 4W-5. Boring 4B-1 is believed to lie near the edge of the historic river channel. Fill materials were encountered in this boring to a depth of twelve feet below grade. Boring 4W-1, which is believed to lie near the



center of the historic river channel, contained fill material to a depth of approximately 14 feet below grade. At the estimated depth of the historic river bed (16 to 18 foot sample), black particles the size of fine gravel were encountered in boring 4W-1. These particles were brittle and released a naphthalene odor when crushed. Based on their fairly uniform, rounded appearance and characteristic odor, we believe these may be coal tar globules that were historically transported to Area 4 via stream flow. The only PID headspace measurements greater than 1 ppm in Area 4 were from boring 4W-1, which had a maximum PID measurement of 3.4 ppm at 16 to 18 feet below grade.

Borings 4B-2 and 4B-3 are believed to represent native materials from outside the lateral limits of the historic river channel. Soils from these borings consisted of sand, silt and clayey silt deposits with no visible fill materials.

One to two samples from each boring were submitted for laboratory analysis. Analytical results are discussed in Section 5.4.

4.4.2 Hand Borings

Two hand borings were performed in Area 4, both in the wet sediments adjacent to existing stream flow in the channel. Hand boring 4H-5 was located immediately downstream of the culvert which discharges on the east side of Pleasant Street. Boring 4H-6 was located on the west side of Pleasant Street, near the stream south of Millbank Apartments. Water was encountered within a half foot of the ground surface at each location. A slotted steel well point was installed at location 4H-6 by using a shovel to open up hole large enough to accommodate a sand pack around the well screen.

4.4.3 Groundwater Monitoring

Groundwater sampling in Area 4 was conducted using low flow technologies, except on one date (August 12, 2003) when conventional bailing methodologies were utilized. The bailer sampling was conducted to evaluate elevated lead and mercury levels that had been reported in groundwater from monitoring well 4W-1 in July 2003 (see discussion of results in Section 5.4). The lead results were considered suspect due to sediment in the sample, despite the use of low flow methods in July. Bailing was considered a more effective way to remove silt from the wells. A minimum of three times the volume of standing water was purged from the monitoring well prior to groundwater sampling with bailers. Groundwater sample collection logs are provided in Appendix E.

The field staff noted a naphthalene odor in the vicinity of wellpoint 4W-6 on October 21, 2003. The source of the odor could not be identified.

Groundwater samples were submitted to AMRO Laboratory of Merrimack, New Hampshire for analysis in accordance with the QAPP. In October 2003, selected duplicate samples were submitted to a second laboratory, Spectrum Analytical of Agawam, Massachusetts, for quality control purposes. Analytical results are discussed in Section 5.4.

4.5 ELEVATION SURVEY AND DEPTH TO WATER TABLE

Huntley Associates, a licensed surveyor in Northampton, Massachusetts, was subcontracted to survey the elevations and locations of the investigation locations, including those performed with

heavy equipment as well as those performed by hand. Survey plans with elevation data are attached in Appendix F.

Depth to water measurements made during groundwater monitoring activities are summarized in Table 6. Because the corridor is essentially linear, these data do not lend themselves to development of a groundwater contour plan. However, the data do indicate an easterly component to groundwater flow direction, as anticipated based on regional topography and historic river flow. The water table drops from an elevation of approximately 116 feet in Area 1 to an elevation of approximately 102 feet in Area 4. This portion of the corridor is on the order of 6,500 feet long, indicating a vertical hydraulic gradient of approximately 0.002 feet per foot for the eastern component of flow along the historic river bed.

5.0 ANALYTICAL RESULTS AND DISCUSSION

This section summarizes the nature and extent of oil and/or hazardous materials (OHM) in site soil and groundwater identified by our investigations. OTO groundwater analytical data are summarized on Table 4. Soil data are provided for Areas 1 through 4 on Tables 7 through 12. Laboratory reports for soil are provided in Appendix G; laboratory reports for groundwater are in Appendix H.

Concentrations of OHM above applicable MCP Reportable Concentrations (RCs) were detected in some soil and groundwater samples. However, the MCP contains exemptions for OHM from certain sources, such as asphalt, coal ash and wood ash. Therefore, while concentrations exceeded RCs in some areas, conditions do not necessarily require reporting to the MADEP. The following sections discuss analytical conditions and identified reportable conditions, if any, for each study area.

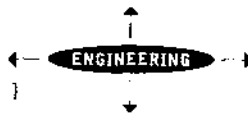
5.1 AREA 1 (WETLANDS)

Area 1 is the westernmost parcel investigated, and runs from the current Mill River dike, across an unpaved former roadway, and through a wetlands area. This section of the possible future river alignment is approximately 700 feet long. Area 1 is abutted by a historic hosiery and felt building and the Smith College Physical Plant. Soil and groundwater testing in this area are described below. Investigation locations are shown on Figure 3.

No reportable conditions or environmental conditions likely to impact the reintroduction of river flow were identified in Area 1 soil or groundwater.

5.1.1 Soil

Four soil/sediment samples were collected from Area 1. Three of these were sediments from the wetlands area, and consisted of dark brown, organic rich, silty sediments. The fourth was collected from the former roadway near the foot of the dike, and consisted of sandy fill material. Each of the soils from this area was analyzed for EPH, PAHs or SVOCs, PCBs and metals. As shown on Table 7, sample 1H-4, collected from the former roadway area, contained low levels of PAHs. Three PAHs were present at concentrations slightly above the RCs, but below MADEP background levels for soils (MADEP, 2002). Based on the low levels present and the former use of the sample area as a roadway, these levels are considered consistent with background resulting from anthropogenic sources, and exempt from reporting. MADEP was notified of these results and our



opinion that the detected concentrations do not represent a reportable condition (OTO, 2003). Based on a meeting with MADEP in November 2003, we understand MADEP is in agreement with that conclusion.

EPH hydrocarbons, PCBs and cyanide were not detectable in the soil/sediment samples from Area 1. Metals concentrations were below RCs. No reportable conditions were identified in Area 1 soil.

5.1.2 Groundwater

One manually placed wellpoint was used to collect groundwater from Area 1. Drill rig access could not be obtained to install a well near the foot of the dike, as originally planned. Wellpoint 1H-5 was placed near the wetland area proximate to the felt building. This well replaced wellpoint 1H-1, which was hand-driven and did not have a sand pack. Wellpoint 1H-1 was found to be unusable for groundwater collection due to the influx of large amounts of silt from the wetlands sediments in the area, and was replaced by wellpoint 1H-5 as discussed in Section 4.1.1. Low flow sampling of this wellpoint was conducted on September 30, 2003. Based on the results of previous soil and groundwater testing in Areas 1 and 2, the constituents of potential concern in this area were narrowed down to lead and mercury by that time.

Groundwater analytical data are summarized on Table 4. No reportable conditions were identified in groundwater in Area 1.

5.2 AREA 2 (VETERAN'S FIELD AND FOOTPATH AREA)

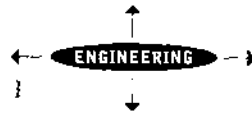
Area 2 abuts the eastern side of Area 1 and the western side of Area 3. It includes a roughly square parcel currently developed as a municipal baseball field, and a linear portion parallel the historic railroad tracks (now an unpaved footpath) where the river previously flowed. This area spans approximately 1500 feet in length. The condominium building on Clark Avenue was historically a water-powered plant used for a series of industrial and commercial operations. Coal and wood ash were identified in Area 2 soils.

No reportable conditions or environmental conditions likely to impact the reintroduction of river flow were identified in Area 2 soil or groundwater, as discussed below.

5.2.1 Soil

Eighteen soil samples from Area 2 were submitted for laboratory analysis. Soil samples were analyzed for a variety of parameters, including EPH, VPH, SVOCs, VOCs, PCBs, pesticides, and/or metals, consistent with the QAPP. Soil analytical data for Area 2 are summarized on Table 8.

Explorations in Area 2 were spaced in a linear fashion along possible future river alignments. One possible alignment would flow directly west to east in the approximate location of the existing culvert on the north side of Veteran's Field; a second possible configuration would circle around Veteran's Field. Soil borings were spaced to provide linear coverage of the area. Sample locations were more densely spaced in the portion abutting the footpath and Clark Avenue condominiums (former manufacturing site), and further apart along the perimeter of Veteran's Field, where more natural conditions were expected based on site use history. Most of the samples submitted for



laboratory analysis were composites collected from the ground surface to the bottom of the boring, and therefore represent materials that may be excavated from the channel in the future.

Materials encountered in Area 2 soil borings included fine to medium sand containing coal, brick and other fill materials underlain by silt and clay, interpreted as native materials. As shown on Table 8, nine of the 18 soil samples from Area 2 were reported to contain PAHs above RCs. One of the Area 2 soil samples (2H-6) contained lead at a concentration of 340 mg/kg, slightly exceeding its soil RC, but below the MADEP background value of 600 mg/kg. These PAHs were identified primarily in the portion of Area 2 parallel to the footpath. With the exception of sample 2B-14, samples collected from around the perimeter of Veteran's Field contained low to nondetectable levels of PAHs. The presence of PAHs along the former riverbed is consistent with historic manufacturing and railroad operations in that area. While PAH concentrations exceed the Massachusetts RCs in some samples, in each case, the detected concentrations are below MADEP background concentrations (MADEP 2002).

The soil sample with the highest PAH concentrations in Area 2 (2B-14) was submitted to Severn Trent Laboratories (STL) for analysis of coal, coal ash and wood ash by microscopic techniques. STL uses a combination of scanning electron microscope with energy dispersive x-ray analysis (SEM/EDX) and polarized light microscopy (PLM) to identify these materials based on morphology and elemental composition. Soil sample SB-14 was found to contain anthracite and bituminous coal and wood ash. The laboratory report is provided in Appendix I. Microscopy results are summarized on Table 12.

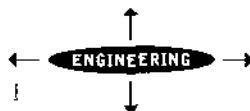
Based on the historic use of the area, the presence of coal and wood ash in Area 2 soils, and the fact that each of the PAH and lead concentrations was below MADEP background values for this type of impact, in our opinion these concentrations are not reportable to the MADEP, pursuant to 310 CMR 40.0317(9). A letter to this effect was submitted to MADEP (OTO, 2003). Based on a meeting between MADEP, OTO and the City in November 2003, we understand MADEP concurs with this conclusion. The PAHs are believed to be the result of historic operations in the area, which included railroad tracks and manufacturing operations, rather than a specific release.

5.2.2 Groundwater

Groundwater samples were collected from four monitoring wells installed in Area 2. Analytical data are summarized on Table 4. Hand-driven wells points 2H-1 and 2H-6 initially installed in this area were not unusable due to very high silt content. A track-mounted Geoprobe unit was subsequently used to access the former riverbed in Area 2 for the installation of three small diameter well points with sand packs.

As shown on Table 4, groundwater samples collected from Area 2 in July and August 2003 were analyzed for VOCs, VPH, EPH, pesticides, metals and cyanide. The organic analytes and cyanide were not detected in Area 2 groundwater.

Groundwater from wells 2T-2 and 2T-3 contained low levels of zinc and lead. Concentrations were below RCs. Monitoring well 2W-9 was reported to contain lead and mercury at concentrations exceeding applicable groundwater RCs. However, the field log indicated water purged from well 2W-9 was "very silty" despite the use of low flow sampling methods (Appendix E). Consistent with the intent of low-flow sampling, these samples had not been field filtered. The suspended sediment level was suspected of causing high bias in the analytical results. Neither lead



or mercury had been identified at elevated levels in soil. Based on the silt content in the well and the anomalously high concentrations, follow-up work was conducted to further investigate the lead and mercury detections in groundwater.

Monitoring well 2W-9 was resampled on August 12, 2003 using traditional bailing methods instead of low flow purging. Aggressive bailing was considered one possible method of developing the well to remove fine particulates. A heavy silt load was still present in the well; groundwater turbidity was off-scale on the field instrumentation. The sample was therefore collected in both unfiltered and filtered (0.45 micron) aliquots for laboratory analysis. The filtered sample required numerous changes of the coarse prefilter and some sediment is believed to have passed into the sample during this procedure. As shown on Table 4, analytical results for bailer-collected samples were significantly higher than for low-flow samples. Additionally, the filtered samples contained significantly less lead than the unfiltered samples. Both of these observations support the conclusion that the sediment is the source of the elevated lead reported in site groundwater.

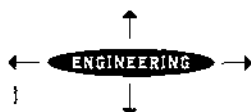
Another round of groundwater sampling was conducted on October 21, 2003, again using low flow methods with no filtration. In addition to total lead analysis, groundwater samples collected on this date were analyzed for tetraethyl lead (TEL), a soluble, mobile form of lead used as a gasoline additive. As shown on Table 4, TEL concentrations were insignificant, and would not account for the previously detected lead concentrations. Sediment was noted in purge water from well 2W-9 on this occasion. The samples collected during this round were split between two labs to assess the possibility of laboratory errors. Data from both laboratories are included on Table 4. The results were inconclusive for well 2W-9, where lead was reported above the RC by one laboratory and below the RC by the other.

The well was aggressively purged on December 4, 2003 to remove as much sediment as possible. Because the recovery rate is slow in this silty well, development was done by bailer, which was allowed to drop to the bottom of the well to agitate any material present. Water removed from the well had a heavy sediment loading.

The most recent round of groundwater monitoring was conducted on December 18, 2003 using low flow pumping techniques. Sampling was conducted with scrupulous avoidance of the bottom of the well. The purge line was placed just below the top of the water table, and no depth sounding was conducted until after the completion of sampling. The final sample collected from this well was noted to be "slightly silty" and had on-scale turbidity readings. The sample was prepared in the field using two filtration media: a coarse 1.6 micron filter, and the finer 0.45 micron filter that is industry standard. As shown on Table 4, lead concentrations reported for groundwater from well 2W-9 were below RCs during that event.

Based on our observations and the information provided above, the initial lead results for groundwater from well 2W-9 are believed to be due to suspended sediments rather than a dissolved lead condition in groundwater. A letter to this effect was submitted to MADEP to document the investigations performed (OTO, 2004a).

An additional well (2W-16) was installed northeast of well 2W-9 in September 2003 to provide further information on possible lead in groundwater in this area. That well produced clear water, and had no measurable lead content (Table 4).



Based on the investigations described above, in our opinion there is not a reportable condition in groundwater in Area 2.

5.3 AREA 3 (FORMER NORTHAMPTON GAS WORKS)

OTO conducted two borings (3W-1 and 3W-2) in the Old South Street Parking Lot (a.k.a. the Hampton Avenue Parking Lot) on September 30, 2003. Each of these borings was completed as a groundwater monitoring well. These borings are east and downgradient of the former Northampton Gas Works site (RTN 1-14222). Additionally, we observed the performance of one soil boring (WC-30) on the Roundhouse Site performed for W&C on October 13, 2003 as part of their MCP Phase II activities. Soil and groundwater below the Old South Street Parking Lot were found to contain reportable concentrations of constituents, believed to be associated with MGP waste.

Fifteen hand borings were performed in the existing Mill River stream bed east of the Old South Street Parking Lot. As discussed below, MGP waste appears to be located below sediments in the stream bed abutting the parking lot.

Soil and groundwater data collected by OTO are discussed below. This section does not include a discussion of analytical data generated by W&C.

5.3.1 Soil

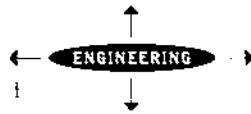
Soil data from the vicinity of Area 3 are summarized on Tables 9 and 10. OTO submitted six soil samples from this area for laboratory analysis. One sample of soil/waste material was collected from W&C boring WC-30 (22 to 24 feet). Two soil samples each from OTO borings 3W-1 and 3W-2 were submitted for laboratory analysis. One of these was also submitted as a blind duplicate for quality control purposes. Additionally, one soil sample collected from a depth of five feet below grade in the stream bed east of the Old South Street Parking Lot was selected for analysis. These samples and associated analytical results are discussed below.

W&C Boring WC-30

Boring WC-30 was performed near the eastern property limit of the Roundhouse Parking Lot, as shown on Figure 5. That boring contained oily black material which had a naphthalene odor and elevated PID readings, and is presumed to be coal tar based on its odor, physical properties, and location within the former coal gasification plant property. The 22 to 24 foot depth sample from that boring exhibited visual and olfactory indicators of coal tar, and had a PID measurement of 272 ppm. OTO submitted for a suite of laboratory analyses including EPH, VPH, SVOCs, metals and cyanide. W&C did not collect a split sample of this material. As shown on Table 9, the sample was found to contain elevated concentrations of PAHs, particularly naphthalene (6,200 mg/kg), and aromatic hydrocarbons in the EPH and VPH ranges. The data are consistent with conditions on this property previously reported to and tracked by MADEP.

OTO Borings 3W-1 and 3W-2

Material similar in appearance and odor to the WC-30 sample was encountered in OTO boring 3W-2 at depths of 15 to 21 feet below grade. The maximum PID recorded in boring 3W-2 was 13.5 ppm, at a depth of 19 to 21 feet below grade. This location is hydraulically downgradient of



Area 3 and boring WC-30. Boring 3W-1 contained fill materials including brick, slag, and what appeared to be asphalt at shallow depths, but did not contain visible coal tar waste.

One soil sample each was selected from borings 3W-1 and 3W-2 for microscopic analysis. The fill sample from 10 to 12 feet below grade in 3W-1 was selected based on visual observation of black material at that depth; a deeper sample (19 to 21 feet below grade) was selected from 3W-2 based on its naphthalene odor, PID response and sheen. As summarized on Table 12, the laboratory reported "heavily tarred asphalt" at 3W-1, 10 to 12 feet below grade. This is consistent with our observations of solid asphalt-like material at that depth. In boring 3W-2, 19 to 21 feet below grade, coal, coal ash and asphalt were reported. Macroscopic pieces of asphalt were not visually evident in this sample, which contained unconsolidated sand material with a black sheen. However, the laboratory indicated their identification of asphalt is based largely on the presence of embedded mineral grains, and coal tar may be misidentified as asphalt if exposure to a soil environment has caused particulate matter to become embedded in it (see letter dated November 6, 2003 in Appendix I). Based on the odor, laboratory results, visual appearance and historic setting, we believe the material present at depths of 15 to 21 feet below grade in boring 3W-2 is likely coal tar.

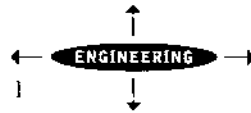
Each of the samples analyzed from borings 3W-1 and 3W-2 contained PAHs at concentrations above RCs. Naphthalene, which is a coal tar indicator, was detected only in the deeper samples (16 to 21 foot depth range); it was not identified in the shallower soils from these two borings. Aromatic EPH range hydrocarbons in 3W-2 (19-21 feet) also exceeded RCs. The PAHs present at shallower depths in boring 3W-1 (4-6 feet) are likely the result of asphalt fragments which were noted in the boring log. There was no naphthalene odor associated with the visible asphalt fragments. Asphalt residues are exempt from release notification pursuant to 310 CMR 40.0317 (12).

Stream Bed Hand Boring SB-7

One soil sample from a hand boring in the streambed east of the Old South Street Parking Lot was submitted for laboratory analysis of EPH, VPH, SVOCs and microscopic analysis for coal/ash/tar. That sample, collected from a depth of 4 to 4.5 feet below at location SB-7, was selected based on its naphthalene odor and black appearance. This black odorous material was not encountered in other stream bed hand borings, however, most of the boreholes could not be advanced more than two feet below grade due to collapse of the wet materials.

Analytical data are summarized on Table 10. Soil sample results from borings WC-30 and 3W-2 are also included on that table for comparison, as those borings also contained black material with a naphthalene odor. Sample SB-7 was found to contain high concentrations of PAHs and EPH aromatic hydrocarbons. Four PAHs [benzo(a)pyrene, benz(a)anthracene, benzo(b)fluoranthene and indeno(1,2,3-c,d)pyrene] were present at concentrations exceeding their Upper Concentration Limits promulgated in 310 CMR 40.0996(7). Based on their similar odor, appearance, and chemical make-up, the material present in borings SB-7, WC-30 and 3W-2 is believed to have an MGP source.

Microscopic analytical data are summarized on Table 12. As shown, sample SB-7 was reported to contain a light loading of bituminous coal and coal ash, a trace of wood ash, and a heavy concentration of asphalt. This is consistent with microscopic results for the sample from 3W-2, 19 to 21 feet below grade. As previously discussed, the laboratory has indicated that coal tar may be misidentified as asphalt based on the presence of embedded particles. Sample SB-7 contained



unconsolidated materials with a viscous black coating, and did not contain visible solid fragments that appeared to be asphalt.

Reportable Condition

Since PAH exceedances of RCs were not previously reported for the Old South Street Parking Lot, discovery of this condition triggered an obligation for the City to notify MADEP within 120 days of their knowledge. A Release Notification Form and letter report documenting soil and groundwater conditions in this area was therefore submitted to MADEP in March 2004 (OTO, 2004b).

In our opinion, the PAHs exceeding RCs in soil samples collected from 15 to 21 feet below grade at 3W-1 and 3W-2 are the result of the known upgradient coal tar site. In addition to the PAHs, soil samples from borings 3W-1 and 3W-2 contained carbazole and dibenzofuran in samples from depths of 16 to 21 feet below grade. While not present at reportable levels, these constituents are of interest because they are known to be associated with MGP waste (GRI, 1996) and were also detected in Roundhouse Parking Lot sample WC-30. MADEP issued a letter dated April 27, 2004 which indicated they concur with this conclusion, and a separate RTN was not issued for conditions reported below Old South Street Parking Lot.

Conditions encountered in hand boring SB-7 below the existing stream bed could also be interpreted to constitute a reportable condition. However, based on MADEP's April 27, 2004 letter, we believe this material would also be considered a portion of the release associated with RTN 1-14222, and not a new reportable condition. The SB-7 data were forwarded to BSG. In an email response dated October 15, 2004, BSG indicated they had discussed the data with MADEP, and BSG was assuming responsibility for investigating the area.

Boring 3W-2 Waste Disposal

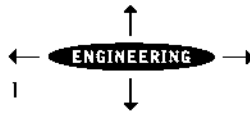
Based on the oily appearance and strong odor exhibited by materials from depth in boring 3W-2, waste cuttings from this boring were drummed for disposal. Characterization analysis is provided on Table 9. Drum removal was performed by Clean Harbors Inc. on behalf of Bay State Gas, concurrently with several other drums of material generated during their soil boring program at the Former Northampton Gasworks Site. The manifest is retained by Bay State Gas.

5.3.2 Groundwater

Area 3 groundwater analytical data are provided on Table 4. Two monitoring wells (3W-1 and 3W-2) were installed in this area and sampled by OTO. A blind duplicate of the groundwater sample from well 3W-1 was submitted in September 2003 for quality control purposes.

Phenanthrene, a PAH, exceeded the applicable groundwater RC in both wells 3W-1 and 3W-2. In our opinion, this compound is likely the result of coal tar residues, which have been observed in soils below the water table at well 3W-2 and other upgradient locations. The phenanthrene in groundwater condition was reported to the MADEP in the same submittal as the RC exceedances for soil, as discussed above (OTO, 2004b).

The total cyanide concentration in monitoring well 3W-1 groundwater exceeded the RC during the September 30, 2003 sampling round. However, the RC for cyanide technically applies to



physiologically available cyanide, not total cyanide. The well was therefore resampled for analysis of physiologically available cyanide, which was not detected. Because the RC applies specifically to physiologically available cyanide, the total cyanide results do not constitute a reportable condition. These data indicate that while present, the cyanide is chemically bound in a manner that makes it less toxic to living organisms.

Well 3W-2 contained a lead concentration above the RC (30 ug/l) when it was first sampled on September 30, 2003. The groundwater sample log (Appendix E) noted a sheen, coal tar odor, and off-scale turbidity readings at this location. The well was resampled in October 2003, and splits sent to two different laboratories. One laboratory reported 32 ug/l lead, slightly above the 30 ug/l RC, during this round. The second laboratory reported 22 ug/l lead. A third round of groundwater sampling was conducted at this well on December 12, 2003. As shown on Table 4, lead was not detected during that event. In our opinion the lead results do not indicate a reportable condition in regards to lead in groundwater at this location.

In summary, groundwater below the Old South Street Parking Lot contains phenanthrene at a concentration which exceeds the applicable RC. Other constituents were present in site groundwater at concentrations below their applicable RCs. This condition was reported to MADEP by the City in March 2004. MADEP responded in an April 27, 2004 letter which referenced the Former Northampton Gas Works RTN (1-14222) and indicating a separate Release Tracking Number would not be assigned to the Old South Street Parking Lot at that time.

Bay State Gas has advised the City that it will perform additional studies in the Old South Street Parking Lot to evaluate whether or not the Former Northampton Gas Works Site is the source of the reportable releases in that area. That work is on-going.

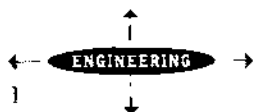
5.4 AREA 4 (MASSACHUSETTS HIGHWAY PROPERTY)

Area 4 is the furthest downstream property included in the investigation. It lies approximately 2,400 feet southeast of the former coal gasification plant (Area 3), with an uninvestigated stretch of former riverbed in between. Culverted surface water flow daylight in this area, and subsequently flows east into the Connecticut River.

A reportable condition was identified in Area 4 soil based on the presence of PAH concentrations above RCs. The property owner, Mass Highway, reported the condition to MADEP on May 23, 2003 and filed for Downgradient Property Status based on the apparent historic transport of materials to their property from an upstream location. The property is currently tracked under RTN 1-14853. OTO's soil and groundwater testing in this area are discussed below. Soil and groundwater analytical data from a previous study in this area conducted by others is provided on Tables 1 and 2.

5.4.1 Soil/Sediment

Two hand borings and five hollow stem auger borings were conducted in Area 4. Exploration locations are shown on Figure 6. Soil and sediment data from this area are summarized on Table 11.



Sediments

The two hand borings (4H-5 and 4H-6) performed in Area 4 were located in river sediments adjacent to existing stream flow. Both samples were collected from materials believed to be underwater during periods of high flow. Materials encountered in boring 4H-5 consisted of dark brown organic rich silt. Boring 4H-6 encountered rounded coarse sand and gravel below an upper six inch thickness of mucky silt. A slight naphthalene-like odor was noted in sediments from location 4H-6.

Sediment samples from the two borings were analyzed for a suite of parameters including VPH, EPH, SVOCs, metals, PCBs, and/or pesticides. As shown on Table 11, sediments from 4H-5 and 4H-6 both contained PAHs at concentrations exceeding RCs. The sample from location 4H-5 was also submitted to the laboratory as a blind duplicate. One duplicate sample was reported to contain 310 mg/kg lead, exceeding the RC of 300 mg/kg. The other duplicate sample was reported to contain 260 mg/kg lead. This information was conveyed to the property owner, the Massachusetts Highway Department, for their determination of reporting requirements.

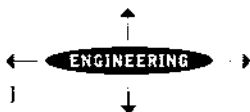
Organic constituents and other metals were nondetect or present below RCs in sediments. Soil RCs are not technically applicable to sediment samples, but were used for comparative purposes.

Soils

Five hollow stem auger borings were performed in Area 4. One of these borings (4W-1) was performed in a location estimated to be near the center of the historic Mill River channel. Soil boring 4B-1 is believed to be on the edge of the former riverbed, while 4B-2 and 4B-3 were placed to be laterally outside of historic river limits. Fill materials were observed in borings 4W-1 and 4B-1 to depths of 14 feet below grade. Layers of sediment construed to be native historic riverbed were encountered at 20 feet below grade in boring 4W-1. Borings 4B-2 and 4B-3 encountered fine to medium sand and silt to the maximum depth explored (18 feet below grade). Fill materials were not noted in these borings, consistent with their location outside the river channel.

Street level grade in Area 4 lies approximately 14 feet above the current riverbed elevation where stream flow emerges from below Pleasant Street. Samples collected from depths of approximately 14 to 15 feet below grade in borings at road level therefore correspond to the same elevation within the riverbed as 0-1 foot depth sediment samples 4H-5 and 4H-6.

Fill materials present in boring 4B-1 included coal fragments from ground surface to approximately nine feet below grade. Fill materials encountered in boring 4W-1 included wood fragments and gravel in the upper 10 feet. Soil samples collected from the approximate level of the historic riverbed (16 to 18 feet deep) contained small, black, hardened globules that released a naphthalene odor when crushed. PID headspace readings were higher in samples from the historic riverbed than in the upper fill materials. A sample of the material from 4W-1, 16 to 18 foot depth was submitted for microscopic analysis. As shown on Table 12, anthracite coal and asphalt-like material were present in this sample. The laboratory indicated that asphalt identification is based on the presence of embedded minerals, and that coal tar may therefore be misidentified as asphalt after exposure to a soil environment (see letter in Appendix I). Based on our observations and the analytical data described below, we believe this material to be coal tar. The small, individual rounded shapes present in soils from 4B-1 do not have the macroscopic appearance of asphalt.



As shown on Table 11, PAHs were detected at concentrations above RCs in soils from locations 4B-1 and 4W-1 (inside the historic riverbed), 4H-5 and 4H-6 (in the current stream bank) but not 4B-2, 4B-3 or 4W-5 (outside the former river channel). The highest concentrations were detected in the 16 to 18 foot depth sample from boring 4W-1, which contained the black particles with naphthalene odor. This sample contained 62 mg/kg naphthalene, as well as carbazole and dibenzofuran, which are present in MGP wastes. Based on the chemical analysis, microscopic analysis, and location on the historic riverbed, these particles may be coal tar globules that were transported to this area by historic stream flow.

The constituents detected in soil from 4W-1, 16 to 18 foot depth, include elevated EPH aromatic hydrocarbons, but no detectable aliphatic hydrocarbons. The suite of PAHs detected in 4W-1 was similar to that detected in sample 4H-5, collected from the current riverbed, although the sediment sample did contain aliphatic hydrocarbons. Soils from borings placed to be outside the historic riverbed (4B-2, 4B-3 and 4W-5) did not contain detectable levels of PAHs, and other constituents were present at concentrations below RCs. The RC exceedences therefore appear to be associated with materials present in the former river channel. This is consistent with data previously collected by others (Table 1). The PAHs detected in the 5 to 7 foot depth sample from location 4B-1 may be associated with coal or coal ash; coal was observed in shallow fill materials at that location.

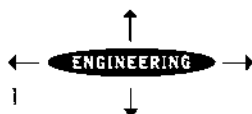
The finding of reportable concentrations of PAHs that may be coal tar residues at a location approximately one-half mile downstream of the Roundhouse Site suggests a potentially significant migration from that site that will require evaluation by further study. As described in Section 3.4.2, MassHighway filed a Downgradient Property Status Opinion prepared by Fuss & O'Neill (F&O) based in part upon the data collected by OTO. OTO agrees with the F&O conclusion that Downgradient Property Status is appropriate for this location.

In summary, in Area 4, soil/fill materials within the historic river channel show PAH impacts at levels above RCs. Soils outside the historic river channel in this area do not exhibit a reportable condition.

5.4.2 Groundwater

Three groundwater monitoring points are located in or immediately west of Area 4: two standard monitoring wells installed in boreholes performed by hollow stem auger (4W-1 and 4W-5) and one hand-driven wellpoint near the current river edge (4W-6). Phenanthrene, a PAH, was detected in groundwater from well 4W-1 at a concentration exceeding the RC. Other PAHs were also detected in groundwater from this well. The constituent detected at the highest concentration at 4W-1 was naphthalene (320 ug/l), although that parameter does not exceed the RC. This well is located within the historic river channel, which is presently filled. Soil from this boring contained hardened particles of tar-like material and elevated concentrations of PAHs. The finding of PAHs in groundwater is therefore consistent with soil data.

Groundwater from monitoring well MW-2 was found to contain lead (260 ug/l) above the RC (30 ug/l) in July 2003. However, groundwater from this well had a high silt content despite the use of low flow pumping techniques. Previous groundwater testing by others in this area (Table 2) did not identify lead in groundwater as an issue. This previously existing T&B well MW-2 was mistakenly sampled instead of nearby OTO well 4W-1 in July 2003.



Monitoring well 4W-1 was sampled on August 12, 2003 using traditional bailing methods instead of low flow purging. Aggressive bailing was considered one possible method of developing the well to remove fine particulates. A heavy silt load was present in the well; groundwater turbidity was off-scale on the field instrumentation. The sample was therefore collected in unfiltered form for a suite of metals analyses, and filtered (0.45 micron) for lead analysis. As shown on Table 4, the lead result for the unfiltered bailer-collected sample was significantly higher than for the filtered sample, indicating the sediment was the source of the lead.

Well 4W-1 groundwater was resampled on October 21, 2003, using low flow methods with no filtration. In addition to total lead analysis, groundwater samples collected on this date were analyzed for tetraethyl lead (TEL), a soluble, mobile form of lead used as a gasoline additive. As shown on Table 4, TEL was detected, but at a concentration (5 ug/l) that would not account for the previously detected lead concentrations. Sediment was noted in the samples on this occasion. The samples collected during this round were split between two labs to assess the possibility of laboratory errors. Data from both laboratories are included on Table 4. The results were fairly consistent, and were above the lead RC.

The well was aggressively purged on December 4, 2003 to remove as much sediment as possible. Because the recovery rate is slow in silty wells, development was done by bailer, which was allowed to drop to the bottom of the well to agitate any material present. Water removed from the well had a heavy sediment loading, and a naphthalene odor.

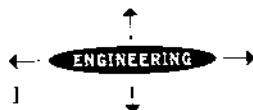
The most recent round of groundwater monitoring was conducted on December 18, 2003 using low flow pumping techniques. Sampling was conducted with scrupulous avoidance of the bottom of the well. The purge line was placed just below the top of the water table, and no depth sounding was conducted until after the completion of sampling. The water purged from this well was noted to be silty. The sample was prepared in the field using two filtration media: a coarse 1.6 micron filter, and the finer 0.45 micron filter that is industry standard. As shown on Table 4, lead concentrations reported for groundwater from well 4W-1 were below RCs during that event.

Based on our observations and the information provided above, the initial lead results for groundwater from well 4W-1 are believed to be due to suspended sediments rather than a dissolved lead condition in groundwater. A letter to this effect was submitted to MADEP to document the investigations performed (OTO, 2004a). As such, we do not believe that a reportable condition exists in regard to lead in groundwater in Area 4.

5.5 SUMMARY OF REPORTABLE CONDITIONS

Area 1 and Area 2: No reportable conditions were identified in soil or groundwater in Areas 1 and 2. Polycyclic aromatic hydrocarbons (PAHs) were detected in soil from these areas at concentrations above RCs. However, the levels are consistent with MADEP published urban background that may result from combustion of coal, wood and/or petroleum products. Microscopy confirms the presence of coal and wood ash in soil from this area. Constituents associated with coal and wood ash are exempt from reporting under the MCP.

East of Area 3: PAHs are present above RCs in soil and groundwater below the Old South Street Parking Lot. EPH aromatic hydrocarbons exceed their applicable RCs in soil, but not in groundwater. A Release Notification submittal for soil and groundwater conditions below the Old South Street Parking Lot was made to the MADEP in March 2004. MADEP indicated they consider the area to be part of the Former Northampton Gas Works Site (RTN 1-14222) at this



time. No separate reportable condition has been identified. Bay State Gas is performing additional investigations which are on-going in the area.

Area 4: Massachusetts Highway Department Property: The portion of Area 4 owned by the Massachusetts Highway Department contains PAHs above Reportable Concentrations in soil and groundwater. These conditions were reported to MADEP by the Massachusetts Highway Department, which filed a Downgradient Property Status Opinion for the site in May 2004. The elevated PAH concentrations are limited to soils within the current and historic riverbed, and may be associated with hardened black globules that appear to be coal tar. Soils from outside the riverbed did not exhibit PAH impacts.

Area 4: City Owned Property: OTO hand boring 4H-5 and T&B boring MW-3 are located on Area 4 land believed to be owned by the City. No reportable conditions were identified on this property. Sediment sample 4H-5, collected from the current Mill River streambed, contained EPH aromatic hydrocarbons and several individual PAHs above soil RCs. However, soil Reportable Concentrations do not apply to sediment samples, and are used for comparative purposes only. Soil from boring MW-3 did not contain reportable concentrations of analytes.

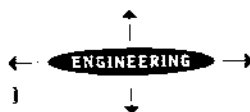
5.6 DATA QUALITY

Quality assurance/quality control (QA/QC) measures taken during sampling activities included collection of trip blanks, equipment blanks, intra-laboratory duplicates, and inter-laboratory duplicates. A summary of the number and type of QA/QC samples collected is provided on Table 13.

Laboratory precision and accuracy was evaluated through standard analytical procedures, consistent with the QAPP. The laboratory data packages were reviewed to evaluate whether their precision and accuracy are appropriate for their intended use, per the MCP, 310 CMR 40.0017 (1). This evaluation was based upon a review of results for:

- Holding times;
- Field blanks;
- Field duplicates;
- Laboratory blanks;
- Surrogate spike recoveries;
- Matrix spike/matrix spike duplicates results;
- Unspiked laboratory duplicates;
- Pesticide calibration checks; and
- Laboratory control samples.

Data validation worksheets are provided in Appendix J. A modified Tier I validation was performed, including a completeness review and Tier II validation recommendations for each data package. Raw data was not requested or provided with the data packages, but is maintained by the laboratory for future use if needed. Validation findings and actions are summarized below.



Holding Times

The samples were extracted and analyzed within specified holding times, and were held under appropriate conditions, with the following exceptions.

One set of samples was noted to be received at 14 °C, and the laboratory contacted OTO to inquire whether they should be analyzed. Because the samples were to be analyzed for metals only, holding at room temperature was considered acceptable, and the laboratory was instructed to analyze the samples.

Five soil samples in AMRO laboratory batch number 0307010 were extracted beyond the allowable seven day hold time for semi volatiles. The hold times were extracted eight to eleven days after collection. Because hold times were not grossly exceeded the data are still considered usable, but as estimates only. Semi volatile analytical data for soil samples 2B-11, 2B-12, 2B-14, 2B-15 and 1H-4 have been flagged with a "J" qualifier (Tables 7 and 8), indicating positive results and detection limits are considered estimated.

Field Blanks

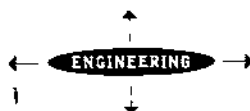
Trip blanks were included at a rate of one per cooler on dates when VOC or VPH samples were collected. Trip blank results are included on analytical data tables, and may apply to samples from more than one area of the site. No analytes were detected in the trip blanks collected for this project.

An equipment blank was prepared during the first groundwater sampling round (July 15, 2003) to evaluate the possibility of contamination from the equipment used. Distilled water was pumped through the peristaltic pump head and associated tubing used for groundwater sample collection. The equipment blank was submitted to the laboratory for the same analytical parameters as the groundwater samples collected on that date, and is included on Table 4. No target analytes were detected in the equipment blank.

A second field blank associated with groundwater was submitted with the December 2003 sampling round. Those investigations were being conducted to evaluate the cause of elevated lead levels reported in groundwater samples from several monitoring wells. Because the impacted wells shared similar construction, we evaluated the possibility that the filter sand placed around the well screen during construction was contaminated with lead. A sample of filter sand was obtained from the drilling company and placed in a sample jar with distilled water. The jar was shaken vigorously then allowed to sit for several days. The water from this jar was decanted and submitted to the laboratory for analysis. Lead was not detected in the sample, identified on Table 4 as "Drill Sand". The source of the elevated lead levels in certain groundwater samples was subsequently identified as heavy sediment loading from the native fines in the former riverbed.

Field Duplicates

Field duplicate results provide a measurement of both sampling and analytical precision. Two types of field duplicates were collected for this project: intra-laboratory duplicates sent blind to the same laboratory, and inter-laboratory duplicates submitted to two different laboratories. Intra-laboratory duplicates were collected at an overall rate of one per 20 samples. Inter-laboratory duplicates were collected at a rate of 100% during lead in groundwater evaluations in October and December 2003,



to evaluate the possibility of laboratory error. In each case, the duplicates were submitted to the laboratory blind (not identified as duplicates).

Duplicates were evaluated by calculation of the relative percent difference (RPD) between the two analytical results. Duplicate results and RPDs are summarized on Table 14. As shown, groundwater sample 3W-1 was analyzed for a full suite of organic and inorganic parameters, each of which had acceptable duplicate RPD results. Inter-laboratory duplicate results were also within acceptance criteria, with one exception. Lead analysis for sample 2W-9 collected October 21, 2003 had an inter-laboratory RPD of 56%. Those lead results are considered estimates, and have been flagged with a "J" qualifier to indicate uncertainty in quantitation.

Soil duplicate results from location 4H-5 had RPDs within acceptance criteria, indicating good sampling and analytical precision. However, the duplicate soil samples collected from boring 3W-1, 16-18 feet below grade, exhibited high RPDs for most semi volatile constituents and for mercury (see Table 14). This soil sample was impacted by oily waste, and was likely heterogeneous. The semi volatile and mercury results for duplicate samples 3W-1 and 3W-1D are considered estimates, and are J-flagged on Table 9.

The results of duplicate samples collected for this project indicate sampling and analytical precision for both soil and groundwater was generally acceptable. Sample heterogeneity affected precision in waste sample 3W-1.

Laboratory Blanks

Laboratory method blanks were prepared for each analytical method, and were free from contamination. In rare instances a trace of one analyte (such as naphthalene or silver) was detected, but was either not detected in samples or was present at much higher concentrations than the blank level. No validation actions were taken based on laboratory blank data.

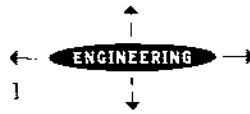
Surrogate Spike Recoveries

Surrogate spikes are compounds added to each sample to evaluate sample-specific effects in organics analyses. Surrogates are evaluated based on their percent recovery (%R) which is optimally 100%, indicating the lab detected the entire amount of spike added to the sample. Surrogate spike recoveries were generally within acceptance limits, with an occasional recovery slightly above or below limits. No validation actions were taken based on surrogate spike recoveries.

Matrix Spike/Matrix Spike Duplicate Results

Matrix spike/matrix spike duplicate (MS/MSD) samples were analyzed at a rate of one per twenty samples per medium per analysis. In some cases where very few samples were collected on a given date, a laboratory batch MS/MSD was performed on a sample from another source instead of a project sample. These samples are evaluated based on recovery rates (optimally 100%) and relative percent difference (RPD) between the duplicates (optimally 0%).

Our QAPP indicated MS/MSD results would be tabulated and an average recoveries calculated for soil and groundwater. However, this was not completed, because the laboratory spikes were performed for the full analytical suite (66 targets in the VOC analyses; 67 targets in the SVOC



analyses). Knowing medium-specific average spike recoveries were not deemed valuable enough to be worth the time involved in these calculations. Overall, MS and MSD results for both matrices were acceptable.

Matrix spike recoveries for thallium were low in AMRO batch 0310110. The nondetect thallium results in soil samples WC-30 and 4H-6 are considered estimates based on possible low recoveries. Thallium MS and MSD recoveries were very low (about 17%) in batch 0310012. Thallium was not detected in the groundwater samples in that batch (1H-5, 2W-16, 3W-1, 3W-1D, and 4W-5 collected 9/30/03), and has therefore been rejected due to the possibility of false negatives.

Lead matrix spike recoveries were slightly low in batch 0310012. Lead results for associated groundwater samples (1H-5, 2W-16, 3W-1, 3W-1D, and 4W-5 collected 9/30/03) have been estimated as a result. The "J" flag indicates possible low bias in lead results for these samples.

The matrix spike recovery for lead was high (136%) in batch 0307122. A high MS duplicate RPD was also reported for lead in this batch. The lead results for groundwater samples collected from wells 2W-9 and MW-2 on July 15, 2003 are considered estimates with possible high bias based on these results.

Unspiked Laboratory Duplicates

Consistent with the 1998 MADEP analytical methods, EPH and VPH analyses were accompanied by an unspiked laboratory duplicate. In general, these duplicates met acceptance criteria, indicating good laboratory precision.

Soil sample 2H-1 had duplicate RPDs of greater than 50% for most of the detected EPH analytes. Positive EPH detections in sample 2H-1 are therefore considered estimates, and are flagged with a "J" on Table 8.

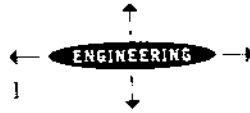
Pesticide Calibration Checks

Calibration drift during pesticide analyses is monitored through continuing calibration checks. Calibration checks exceeded the allowable 15% drift for nearly all analytes in AMRO batch 0306103, which includes samples 2H-4, 2H-7 and 4H-5. Drift was high on both columns. The sample were analyzed a second time, with similar results. Positive pesticide detections in these three samples are considered estimated values due to calibration variability. Positive pesticide detections in samples 1H-4, 2B-13 and 4W-1/16-18 feet are also estimated for calibration drift.

Laboratory Control Samples

AMRO performed laboratory control sample (LCS) analyses for each analysis, including a complete suite of target analytes rather than a selected subset. LCS results are evaluated based on the percent of true value detected (optimally 100%). LCS results were generally acceptable for the full suite of parameters, with exceptions described below.

SVOC LCS recoveries were acceptable for 66 of the 67 target analytes in AMRO batch 0308085. One analyte, 4-chloroaniline, exhibited LCS recoveries of less than 10%. This analyte was not detected in the samples. Due to the possibility of false negative results, 4-chloroaniline results were



rejected in groundwater samples 2T-2 and 2T-3. This analyte was not detected in other soil or groundwater samples collected from the study area, therefore the rejection of this nondetect data is considered insignificant to the overall project.

SVOC LCS recoveries were acceptable for 66 of the 67 target analytes in AMRO batch 0310165. Due to an unknown cause, one analyte, benzoic acid, was not detected (0% recovery) in both the LCS and LCD duplicate. The compound was detected in the continuing calibration check. However, due to the possibility of false negative results, benzoic acid results are rejected in groundwater samples 2W-9, 3W-2, 4W-1, 4W-5 and 4W-6 collected on October 21, 2003. Benzoic acid was not detected in these or other soil or groundwater samples collected from the study area, therefore the rejection of this nondetect data is considered insignificant to the overall project.

LCS data indicate laboratory accuracy for these methods was good.

Based on the above information, the data are found to be within acceptable ranges of accuracy and precision and are acceptable for the project purposes with the qualifiers described in the sections above.

6.0 SOIL EXCAVATION AND DISPOSAL ISSUES

This section provides preliminary estimates of soil volumes that may require disposal at permitted facilities if excavated from the future river channel. Preliminary estimates of disposal costs are also provided.

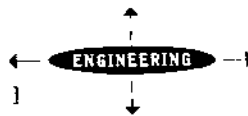
6.1 APPLICABLE REGULATORY PROGRAMS AND DISPOSAL OPTIONS

6.1.1 Federal and State Hazardous Waste Regulations

Federal regulations under RCRA (Resource Conservation and Recovery Act) and corresponding state regulations (310 CMR 19.000) require special handling and disposal for contaminated soils that would be classified as a listed or characteristically hazardous waste. Based on the analytical data generated for this project, materials in the potential future river bed in the vicinity of Area 3 are impacted with coal tar/MGP waste, and would likely require handling and disposal as hazardous waste. No information was obtained from our studies to indicate applicability of these regulations to disposal of excavated soils from Areas 1, 2 or 4.

6.1.2 State Regulations (Massachusetts Contingency Plan)

Management of contaminated soils in Massachusetts are regulated under the Remediation Waste provisions of the MCP (Massachusetts Contingency Plan per 310 CMR 40.0000. In Study Areas 1 and 2, it is our opinion (see Section 5.1 and 5.2) that soil concentrations did not meet release notification thresholds pursuant to the MCP. Nevertheless, the MCP requires that impacted soils be managed in accordance with 310 CMR 40.0032(3) even if contamination is below Reportable Concentrations. A cost effective approach under the MCP would be to manage the materials on-site. This could be accomplished through development of site grading plans where excavated fill could be placed in mounds or raised beds and covered with clean fill, membranes or pavement. While on-site reuse options are not considered at this time given the preliminary nature of project design, we recommend full evaluation during project design. On-site reuse has the potential for significant cost savings relative to costs discussed below.



Consistent with 310 CMR 30.0032(3) (b), soil from Area 1 and Area 2 may be transported off-site without DEP approval, provided it is not "disposed or reused or at locations where existing concentrations of oil or hazardous material at the receiving site are significantly lower than the levels of those oil and/or hazardous materials present in the soil being disposed." In practice, such soils are typically "reused" as landfill daily cover at municipal landfills in accordance with MADEP Policy 97-001 or for final grading of certain closed landfills under MADEP guidelines (MADEP, 2001). Available test data indicate Area 1 and 2 soils meet the criteria for either of these two options.

6.2 VOLUME/ WEIGHT ESTIMATES

Volumes of soil to be excavated in each of the four Study Areas were preliminarily estimated. The estimates were based on excavation of a ten foot wide channel, six feet below the current water table to allow for the placement of bedding materials, with banks sloped at 45 degrees. The groundwater table was estimated from the profile shown on Figure 7. The resulting weight estimates are provided in Table 15 and assumed 1.5 tons per cubic yard of soil. Excluded from the Area 1 weight estimate are approximately 4,000 tons of organic sediments. Sediments in this area were not found to be impacted, and would not require premium management under the MCP.

These weight estimates and resulting cost estimates are not based on project design, and were developed for preliminary, order of magnitude feasibility considerations only. They should not be used for project budgeting purposes. In addition, these estimates are only generated for the four specific areas which comprised our study. These areas in total comprise approximately half of the 1.3 mile stretch of former Mill River Channel within the area being considered for Mill River project.

6.3 PRELIMINARY COST RANGES FOR SOIL DISPOSAL

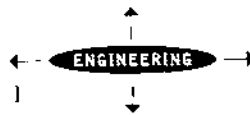
Based on soil volume estimates, preliminary estimates of premium disposal costs to handle contaminated soils are summarized in Table 15. Brief discussions of assumptions made for each Study Area are provided below.

6.3.1 Areas 1, 2 and 4

Based on the analytical data developed during these studies, contaminated soils from Areas 1, 2 and 4 should be acceptable for use as daily cover or grading material at a local landfill. This is a relatively inexpensive option compared to other disposal options. In our experience, costs for such use, including transportation, are currently in the range of \$30 to \$50 per ton. As shown on Table 15, we estimate on the order of 23,000 tons of PAH-bearing soils would be excavated from Areas 1, 2 and 4.

6.3.2 Area 3

Coal tar impacted soils are estimated to be present along an approximately 1,000 foot long stretch of riverbed in Area 3. The coal tar impacts are generally present at depth between 12 and 20 feet below grade, not in surficial materials. Our cost estimate therefore assumes the upper ten to 15 feet of material in this area would be removed first, and transported off-site as PAH impacted soils for use as landfill daily cover. This involves on the order of 13,000 tons of fill at costs in the range



of \$30 to \$50 per ton. Soil impacted with free flowing coal tar/MGP waste would be unacceptable for landfill or asphalt cold batch disposal. Certain thermal treatment methods such as the Re-Soil process offered by Maxymillian Technologies Inc. are specifically licensed to accept coal tar impacted soils. As shown on Table 15, disposal of approximately 10,000 tons of coal tar impacted material is estimated to be on the order of \$50 to \$100 per ton for trucking and disposal, based on an oral quote provided by Maxymillian.

The existing riverbed east of Area 3 was not included in disposal cost estimates. While material believed to be coal tar is located at a depth of approximately four feet below grade in this area, river reintroduction would likely not require excavation to that depth. If plans called for removal of the material from this area, it would require disposal at costs similar to those described above for other coal tar impacted soils.

6.3.3 Summary

In summary, costs for handling and disposal of contaminated soils that may be excavated from Study Areas 1 through 4 of the proposed Mill River Project are estimated to be on the order of \$1,850,000 to \$3,250,000. These estimates do not include costs for excavation, which is assumed to occur regardless of soil disposal issues. Some areas of the future river alignment were not included in the current study, most notably the segment between Areas 3 and 4. Soil volume and cost estimates could not be developed for uninvestigated areas. As noted, these estimates are not based on project design and are subject to significant variability. In addition, the estimates do not consider options to save costs through on-site management of lightly contaminated soils. Such options cannot be evaluated at this time due to limited project design information.

In addition to the soil waste, groundwater waste may be generated during excavation. Because excavation will extend below the water table, dewatering will be required. Collection, treatment (if needed) and discharge of the pumped groundwater would also require a permit. Typically this is done through an emergency surface water discharge permit, following treatment through an activated carbon system. Such premium costs are not considered significant relative to the soil estimates provided in Table 15 and therefore have not been estimated.

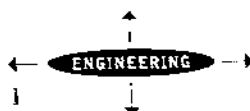
7.0 SUMMARY AND CONCLUSIONS

A Phase II Brownfields investigation has been completed for portions of the historic Mill River Corridor in Northampton, Massachusetts. In accordance with our contract with City of Northampton dated December 17, 2002, this work has included collection and analysis of soil, sediment and groundwater samples from along the historic Mill River corridor.

The following provides a summary of our observations, analytical results, and conclusions for each of the study areas.

Area 1

Area 1 lies at the western end of the historic river channel. It is an undeveloped, primarily wetland area adjacent to historic manufacturing sites. Soils in the wetland area did not have measurable photoionization detector (PID) readings, indicative of total volatile organic compounds. No constituents were identified above Reportable Concentrations in Area 1 wetland soils. A sample collected from a historic roadway near the dike contained polycyclic aromatic hydrocarbons (PAHs)



above Reportable Concentrations. However, these constituents are present below anthropogenic background levels, and are exempt from reporting. However, if excavated and transported off site, these soils would require management under the Bill of Lading process.

Based on our investigations, Area 1 does not have soil or groundwater impacts reportable to the MADEP, or at concentrations considered likely to impact potential future reintroduction of stream flow to the river bed.

Area 2

Area 2 includes a current recreational field and an undeveloped stretch of former riverbed that runs parallel to a former rail bed. A condominium building adjacent to this area was historically used for a variety of industrial and commercial operations.

PAHs are present above Reportable Concentrations in Area 2 soil, but are exempt from reporting based on the presence of coal and wood ash in soil from this area. However, if excavated and transported off site, such as would be required during river reintroduction, these soils would require management under the Bill of Lading process.

Area 2 did not have soil or groundwater impacts reportable to the MADEP, or at concentrations considered likely to impact potential future reintroduction of stream flow to the river bed.

Area 3

Area 3 is the location of the Former Northampton Gas Works Site, which is listed with MADEP due to the known presence of manufactured gas plant (MGP) wastes in soil and groundwater. OTO conducted limited testing of soil and groundwater in this area due to on-going investigations being conducted by others.

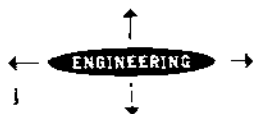
Non-aqueous phase liquid (NAPL) is present across much of Area 3 and the neighboring Old South Street Parking Lot, and may have negative impact on a future waterway or other development in the area. The NAPL is generally present between depths of ten to 20 feet below grade in the historic riverbed area. Excavation to reintroduce stream flow would be expected to proceed to depths of up to 20 feet below grade in this area, and would therefore encounter MGP waste. Black viscous material that appears to be MGP waste has been identified at a depth of four feet below grade in the river bed east of the Old South Street Parking Lot, where stream flow currently exists.

Constituents associated with the MGP waste include naphthalene, cyanide and a suite of polycyclic aromatic hydrocarbons. Migration of these constituents into a future surface water body could pose a risk to aquatic receptors.

Conditions in Area 3 would likely require modifications to the future river design, such as the possible inclusion of an impermeable barrier below the stream bed in this area.

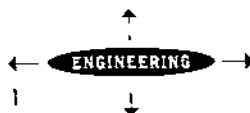
Area 4

Area 4 is the easternmost study area. The portion of Area 4 abutting Pleasant Street is owned by the Massachusetts Highway Department, and has been found to contain reportable concentrations of PAHs in soil and groundwater. The Massachusetts Highway Department has reported this



condition to the MADEP, and has filed a Downgradient Property Status (DPS) Opinion for that parcel. The DPS is based on the fact that soil impacts in Area 4 appear to be present within the historic river channel, but not outside the channel, suggesting an upgradient historic source. PAHs are present in subsurface soils in this area, particularly at depths of 16 to 18 feet below grade, believed to correspond to the historic river bed. Black particles with a distinct naphthalene odor suggestive of coal tar were observed in soil from this depth within the former river channel. Soils collected from beyond the estimated historic lateral extent of the river did not contain elevated PAH concentrations or odorous black particles.

No reportable conditions were identified in the portion of Area 4 owned by the City.



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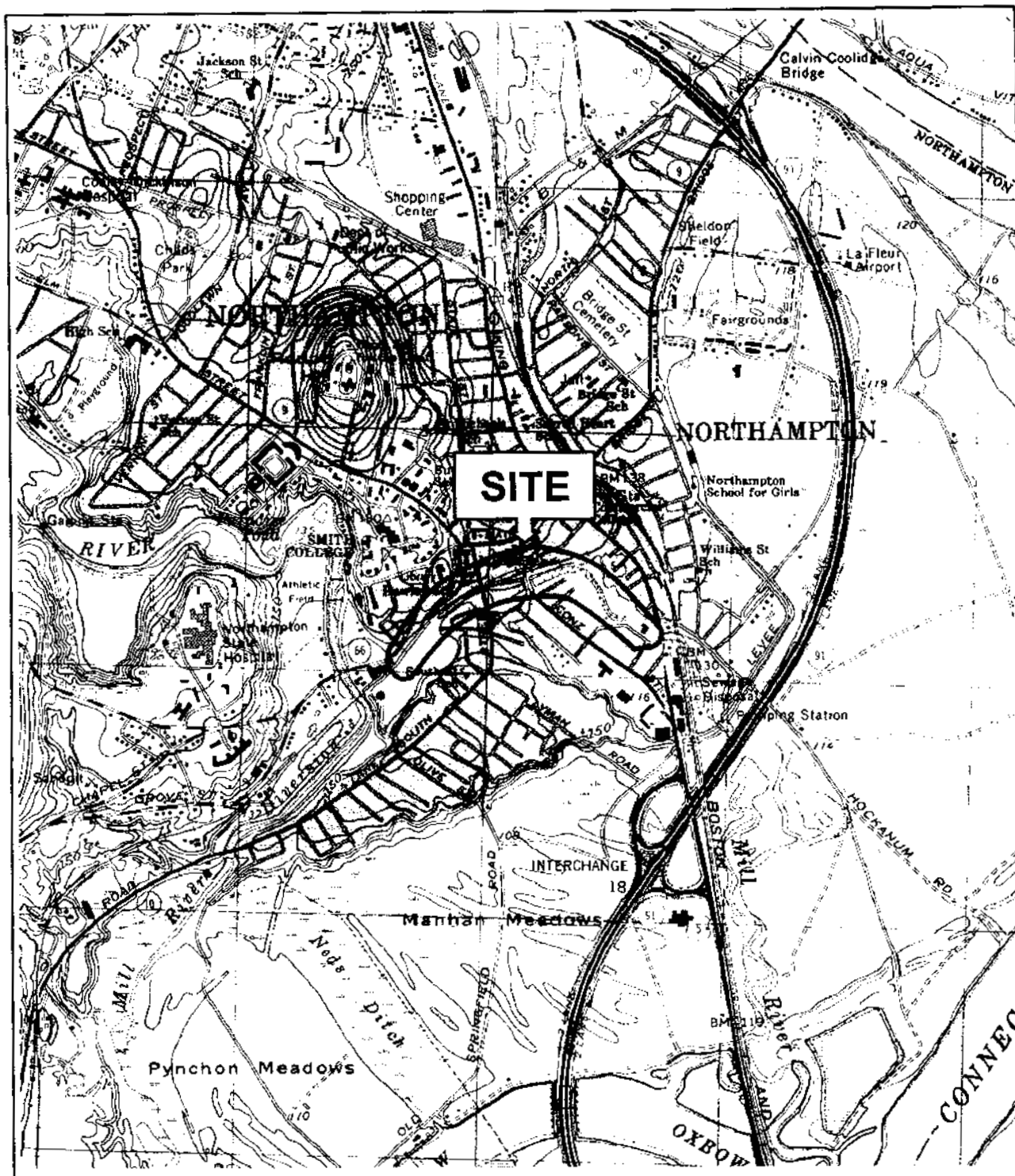
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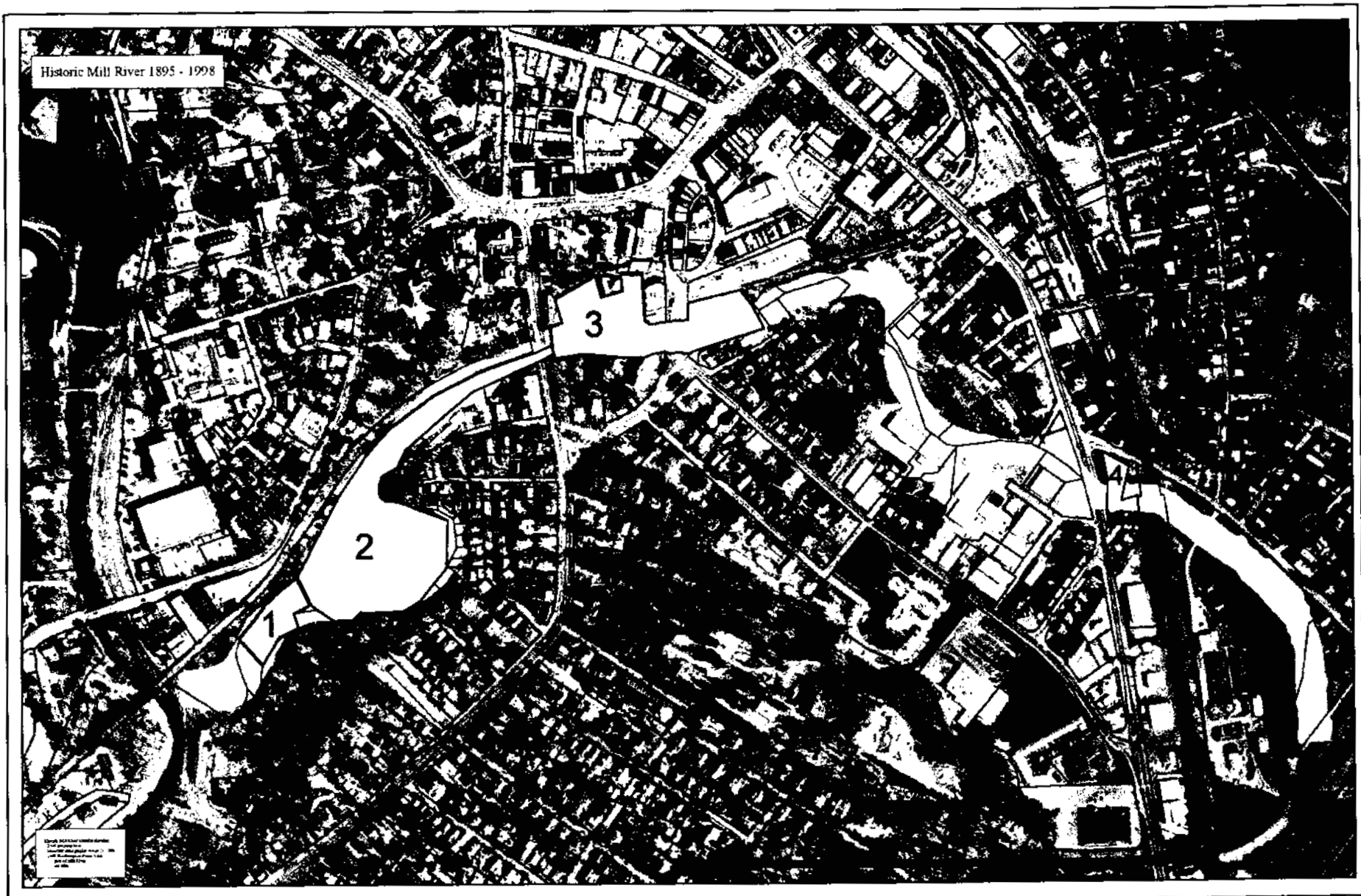
O'Reilly, Talbot & Okun Associates, Inc.

**Historic Mill River
Northampton, Massachusetts**

Site Locus

February 2003

Figure 1



NOTE:

This map was obtained from the www.millriver.org (City of Northampton - Office of Planning and Development) website; plan entitled "Mill River Site Identification Plan"

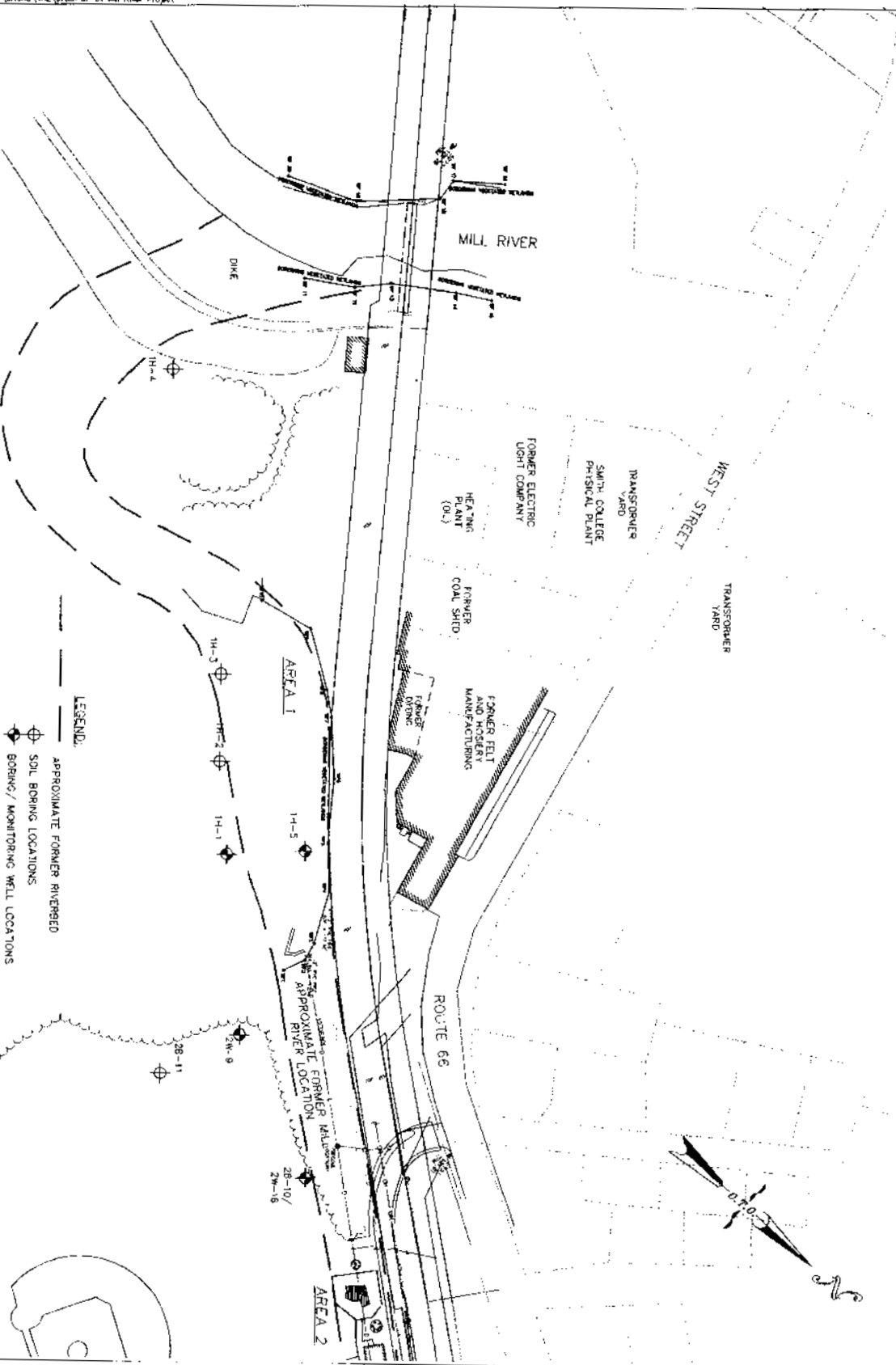
Historic Mill River Corridor

Northampton, Massachusetts

**APPROXIMATE
SCALE:**

1" = 600'

Figure 2
August 2004



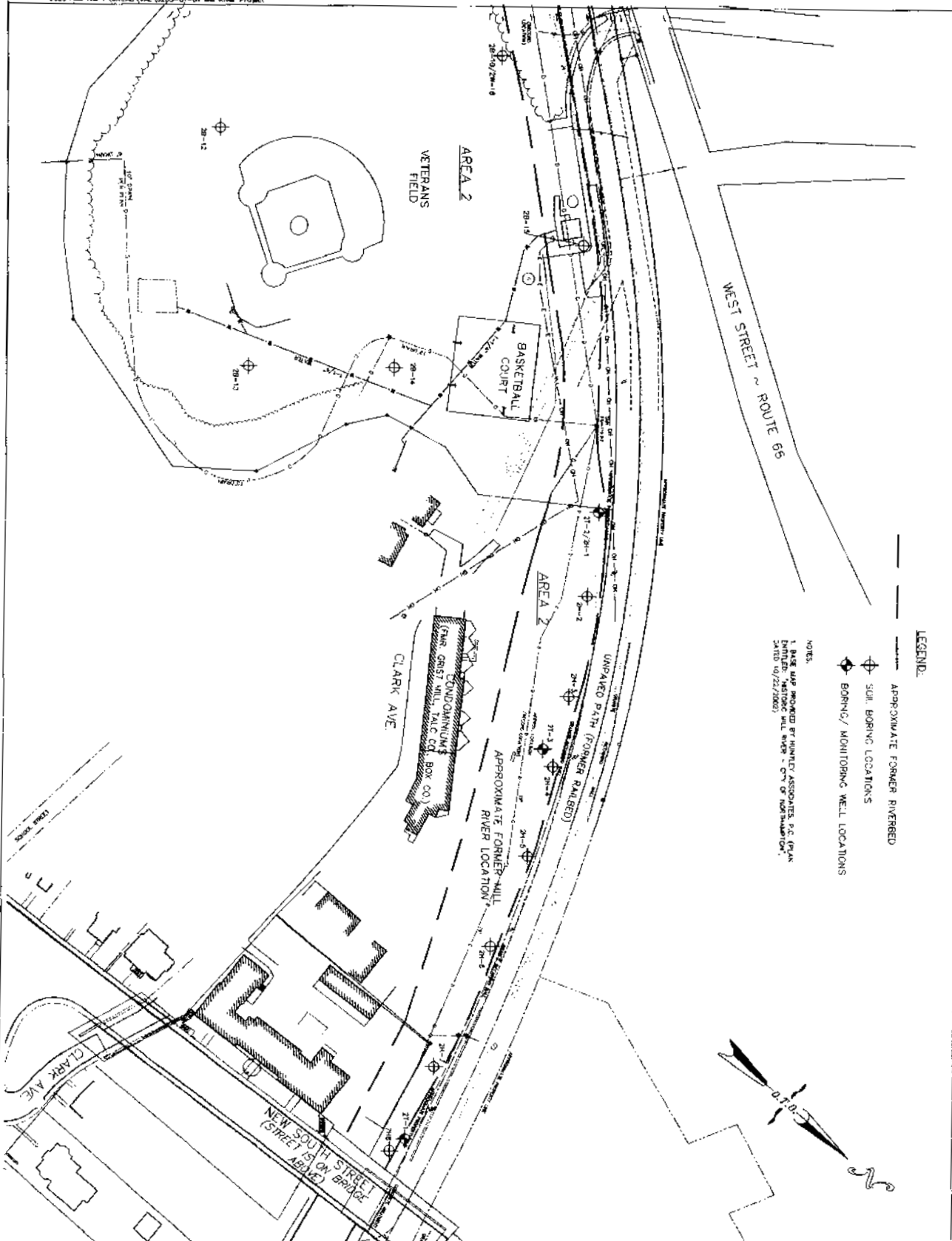
HISTORIC MILL RIVER
NORTHAMPTON, MASSACHUSETTS

EXPLORATION LOCATIONS:
AREA 1

PROJECT No.
J285-03-01

FIGURE No.
3

NOTES:
 1. BASE MAP PROVIDED BY JACOBI ASSOCIATES, P.C. (PLAN DATED 10/22/2002)
 2. ALL RIGHTS - CITY OF NORTHAMPTON.



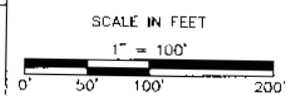
LEGEND:

- APPROXIMATE FORMER RIVERBED
- ◆ SOIL BORING LOCATIONS
- ⊗ BORING/MONITORING WELL LOCATIONS

NOTES:
1. BASE MAP PROVIDED BY QUINCY ASSOCIATES, INC. (1994)
2. HISTORIC MILL RIVER - CITY OF NORTHAMPTON, MA
3. DATE: 10/22/2002

HISTORIC MILL RIVER
NORTHAMPTON, MASSACHUSETTS

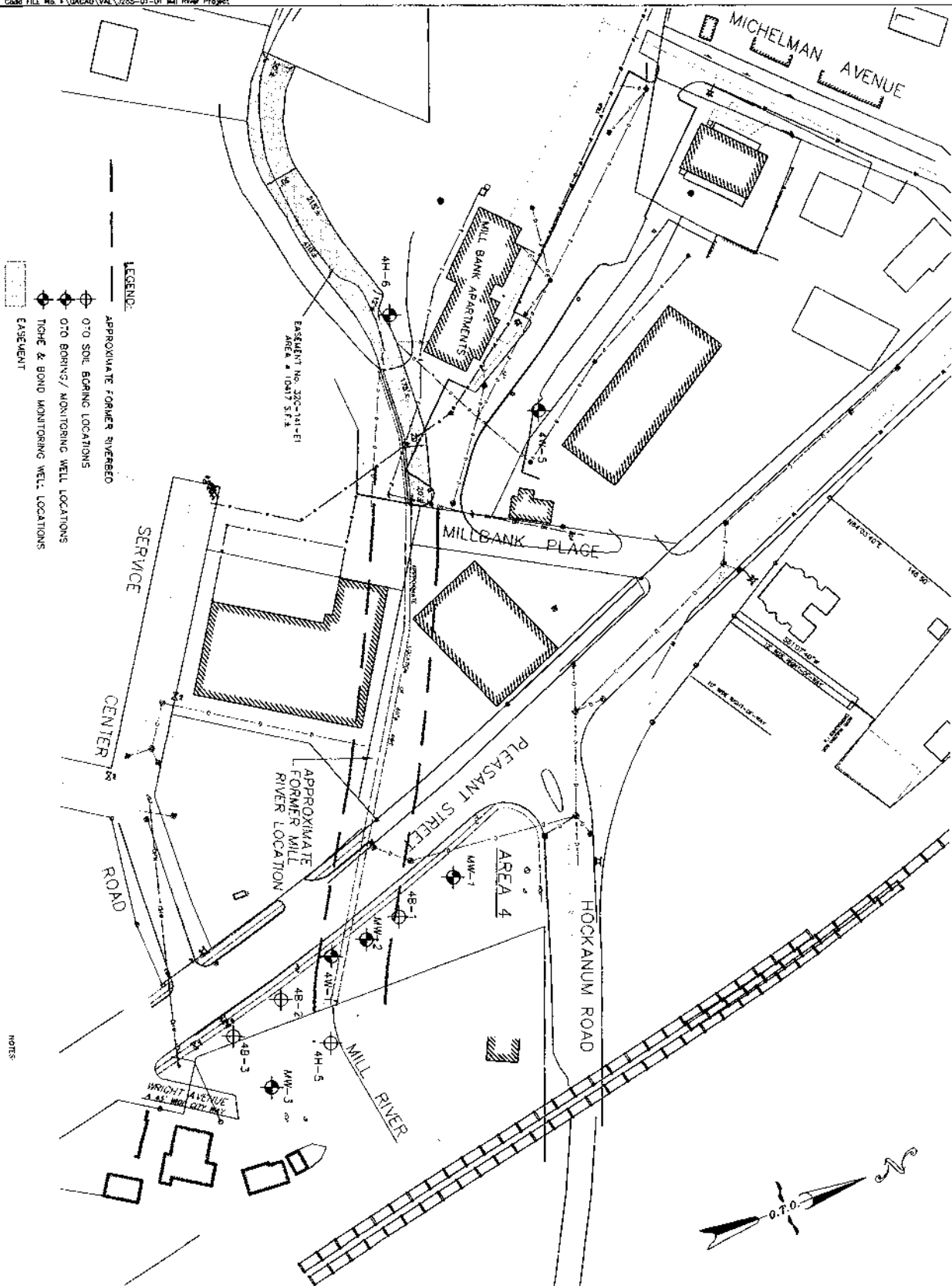
EXPLORATION LOCATIONS:
AREA 2



DESIGNED BY: HA	DRAWN BY: HA
CHECKED BY: KJO	DATE: OCT. 22, 2002
REVIEWED BY: VDW	REV: NOV. 13, 2003/CDA

O'REILLY, TALBOT & OKUN
ASSOCIATES, Inc.

PROJECT No.
J285-03-01
FIGURE No.
4



HISTORIC MILL RIVER NORTHAMPTON, MASSACHUSETTS

EXPLORATION LOCATIONS:
 AREA 4

SCALE IN FEET

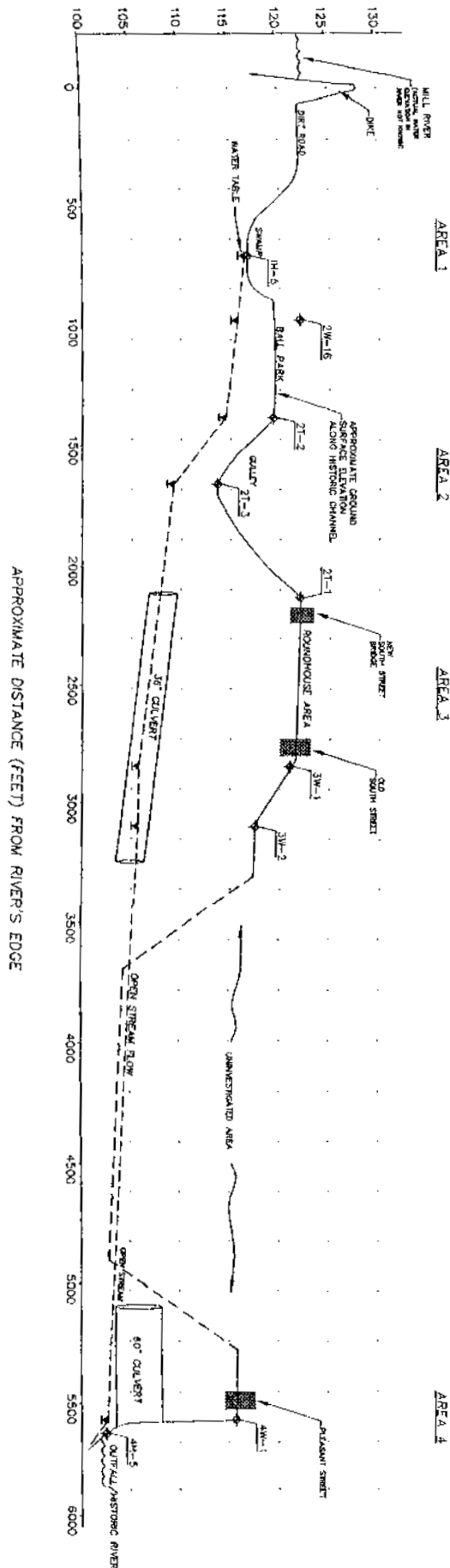
1" = 80'

0' 40' 80' 160'

DESIGNED BY: HA
 CHECKED BY: KJO
 REVIEWED BY: VDW
 DRAWN BY: HA
 DATE: OCT. 22, 2002
 REV: NOV. 13, 2003/CDA

O'REILLY, TALBOT & OKUN
 ASSOCIATES, Inc.

ELEVATION IN FEET



LEGEND
 ◆ MONITORING WELL LOCATIONS
 ▬ APPROXIMATE WATER TABLE ELEVATION

NOTE
 THE TABLE WAS DEVELOPED BY REFERRING TO ELEVATIONS AND DATA COLLECTION MADE FROM THE MONITORING WELLS, AS WELL AS FROM AN EXISTING SET OF DATA. SOME DATA SHOULD BE CONSIDERED INDICATIVE ONLY TO THE DEGREE ALLOWED BY THE METHOD OF DATA COLLECTION.

TABLE 7

PROJECT NO.
 285-03-01

HISTORIC MILL RIVER
 NORTHAMPTON, MASSACHUSETTS

VERTICAL PROFILE
 (NOT TO SCALE)

DESIGNED BY: VDW/KJO DRAWN BY: CDA

O'REILLY, TALBOT & OKUN
 ASSOCIATES, Inc.

Table 1
Soil Analytical Data: Area 4 Phase I Study
Historic Mill River; Northampton, MA
Concentrations (mg/kg)

Sample No.:	MW-1	MW-2	MW-3	Trip	Reportable	DEP
Depth (feet):	15-17'	15-17'	5-7'	Blank	Conc.	Background
Date Collected:	6/18/02	6/18/02	6/18/02	6/18/02	(RCS-1)	in Soil
VPH						
C5-C8 Aliphatics	<2.9	<2.9	<3.2	<2.5	100	NS
C9-C12 Aliphatics	<2.9	<2.9	<3.2	<2.5	1000	NS
C9-C10 Aromatics	<2.9	<2.9	<3.2	<2.5	100	NS
Volatile Organic Compounds						
Ethylbenzene	<0.29	<0.29	<0.32	<0.25	500	NS
Toluene	<0.29	<0.29	<0.32	<0.25	90	NS
Naphthalene	<0.29	<0.29	<0.32	<0.25	4	NS
Nylenes (total)	<0.29	<0.58	<0.63	<0.50	500	NS
EPH						
C9-C18 Aliphatics	<3.8	<8.4	<4.2	--	1000	NS
C19-C36 Aliphatics	4.7	8.9	9.5	--	2500	NS
C11-C22 Aromatics	6.6	127	15	--	200	NS
Target PAHs						
Acenaphthene	<0.38	1.93	<4.2	--	20	2
Acenaphthylene	<0.38	1.81	<4.2	--	100	1
Anthracene	<0.38	5.86	<4.2	--	1000	4
Benz(a)anthracene	<0.38	7.31	0.64	--	0.7	9
Benzo(a)pyrene	<0.38	5.26	0.51	--	0.7	7
Benzo(b)fluoranthene	<0.38	7.75	0.8	--	0.7	8
Benzo(g,h,i)perylene	<0.38	2.62	0.45	--	1000	3
Benzo(k)fluoranthene	<0.38	2.31	<0.42	--	7	4
Chrysene	<0.38	6.31	0.65	--	7	7
Dibenz(a,h)anthracene	<0.38	<0.84	<0.42	--	0.7	1
Fluoranthene	<0.38	18.7	1.4	--	1000	10
Fluorene	<0.38	4.49	<0.42	--	400	2
Indeno(1,2,3-c,d)pyrene	<0.38	2.21	<0.42	--	0.7	3
2-Methylnaphthalene	<0.38	0.84	<0.42	--	4	1
Naphthalene	<0.38	<0.84	<0.42	--	4	1
Phenanthrene	<0.38	24.2	0.84	--	100	20
Pyrene	<0.38	15.1	0.89	--	700	20

Notes:

1. Concentrations reported in mg/kg on a dry weight basis.
2. "--" indicates not tested for this analyte. "<" indicates not detected; value is sample-specific quantitation limit.
3. Not all analytes are shown; refer to laboratory reports for full listing of target analytes.
4. Background levels for soil containing coal ash or wood ash from "Technical Update: Background Levels of Polycyclic Aromatic Hydrocarbons and Metals in Soil" MADEP, 5/23/02.

Table 2
Groundwater Analytical Data: Area 4 Phase I Study
Historic Mill River, Northampton, MA
 Concentrations in ug/liter (ppb)

Location:	Area 4			trip blank	Reportable
Monitoring Well:	MW-1	MW-2	MW-3	TB	Conc.
Date Collected:	6/19/02	6/19/02	6/19/02	6/19/02	RC-GW2
Volatile Petroleum Hydrocarbons					
C5-C8 Aliphatics	<50	<50	<50	<50	1000
C9-C12 Aliphatics	<50	<50	<50	<50	1000
C9-C10 Aromatics	<50	<50	<50	<50	4000
Volatile Organic Compounds					
Benzene	<5	<5	<5	<5	2000
Ethylbenzene	<5	<5	<5	<5	4000
Toluene	<5	<5	<5	<5	6000
Naphthalene	<10	<10	<10	<10	6000
Nylenes (total)	<5	<5	<5	<5	6000
Extractable Petroleum Hydrocarbons					
C9-C18 Aliphatics	<100	<100	<100	--	1000
C19-C36 Aliphatics	<100	<100	<100	--	20000
C11-C22 Aromatics	<100	216	<100	--	30000
Target PAHs					
Acenaphthene	<10	<10	<10	--	5000
Acenaphthylene	<10	<10	<10	--	3000
Anthracene	<10	<10	<10	--	600
Benz(a)anthracene	<10	<10	<10	--	3000
Benzo(a)pyrene	<10	<10	<10	--	3000
Benzo(b)fluoranthene	<10	<10	<10	--	3000
Benzo(g,h,i)perylene	<10	<10	<10	--	3000
Benzo(k)fluoranthene	<10	<10	<10	--	3000
Chrysene	<10	<10	<10	--	3000
Dibenz(a,h)anthracene	<10	<10	<10	--	3000
Dibenzofuran	<10	<10	<10	--	10000
Fluoranthene	<10	<10	<10	--	200
Fluorene	<10	<10	<10	-	3000
Indeno(1,2,3-c,d)pyrene	<10	<10	<10	--	3000
4-Methylphenol	<10	<10	<10	--	100000
2-Methylnaphthalene	<10	<10	<10	--	3000
Naphthalene	<10	<10	<10	--	6000
Phenanthrene	<10	<10	<10	--	50
Pyrene	<10	<10	<10	-	3000
Dissolved Metals (RCRA-8)					
Arsenic	<10	<10	<10		400
Barium	110	143	340	--	30000
Cadmium	<1	<1	<1	-	2000
Chromium	<5	<5	<5	--	100000
Lead	<5	18	<5	--	30
Mercury	<0.20	<0.20	<0.20	--	1
Selenium	<10	<10	<10		80
Silver	<5	<5	<5	--	7

Notes:

1. "<" indicates analyte not detected. Value is quantitation limit.
2. "--" indicates not tested for this analyte.

Table 3
Summary of Explorations Performed for Phase II Study
Historic Mill River; Northampton, MA

Study Area	Hand Auger		Geoprobe		Hollow Stem Auger		Totals
	Soil borings only	Monitoring wells	Monitoring wells	Soil borings only	Monitoring wells		
Area 1	1H-2, 1H-3, 1H-4 (3 total)	1H-1, 1H-5 (2 total)	---	---	---	5	
Area 2	2H-1 through 2H-7 (7 total)	2H-1, 2H-6 (2 total)	2H-1, 2H-2, 2H-3 (3 total)	2B-10 through 2B-15 (6 total)	2W-9, 2W-16 (2 total)	20	
Area 3	SB-1 to SB-3A,B,C; SB-4 to SB9 (15 total)	---	---	---	3W-1, 3W-2 (2 total)	17	
Area 4	4H-5 (1 total)	4H-6 (1 total)	---	4B-1 through 4B-3 (3 total)	4W-1, 4W-5 (2 total)	7	
Totals:	26	5	3	9	6	49	

NOTES:

"---" indicates none of this type of exploration were conducted in this area.

Table 4
Groundwater Analytical Data: Organics and Inorganics
Historic Mill River, Northampton, MA
 Concentrations in ug/liter (qpl)

Monitoring Well:	Area 2				East of Area 3				Area 4				trip blank	trip blank	Reportable Conc.	Reportable Conc.
	2W-9	2T-2	2T-3	3W-1	3W-1D	3W-1	3W-2	MW-2*	4W-5	EB	TB	TB	RC-GW1	RC-GW2		
	7/15/03	8/12/03	8/12/03	9/30/03	9/30/03	10/21/03	9/30/03	7/15/03	9/30/03	7/15/03	8/12/03	9/30/03				
Date Collected:	7/15/03	8/12/03	8/12/03	9/30/03	9/30/03	10/21/03	9/30/03	7/15/03	9/30/03	7/15/03	8/12/03	9/30/03				
Volatile Organic Compounds																
Benzene	< 1	< 1	< 1	110	110	..	2.6	3.9	< 2	< 1	< 1	< 2	5	2000		
Ethylbenzene	< 2	< 2	< 2	150	150	..	26	< 2	< 2	< 2	< 2	< 2	700	4000		
Naphthalene	< 5	< 5	< 5	1100	890	..	390	18	< 5	< 5	< 5	< 5	20	6000		
Toluene	< 2	< 2	< 2	3	2.6	..	7.9	< 2	< 2	< 2	< 2	< 2	1000	6000		
Xylenes (total)	< 4	< 4	< 4	35	36	..	27	< 4	< 2	< 4	< 4	< 2	6000	6000		
Volatile Petroleum Hydrocarbons																
C5-C8 Aliphatics	< 100	< 100	< 100	< 100	< 100	..	< 100	< 100	< 100	< 100	< 100	< 100	400	1000		
C9-C12 Aliphatics	< 25	< 25	< 25	< 25	< 25	..	< 25	< 25	< 25	< 25	< 25	< 25	1000	1000		
C9-C10 Aromatics	< 25	< 25	< 25	680	680	..	160	< 25	< 25	< 25	< 25	< 25	200	4000		
Extractable Petroleum Hydrocarbons																
C9-C18 Aliphatics	< 110	< 110	< 110	< 110	< 110	..	< 100	< 110	< 110	< 110	..	..	1000	1000
C19-C36 Aliphatics	< 110	< 110	< 110	< 110	< 110	..	140	< 110	< 110	< 110	..	..	5000	20000
C11-C22 Aromatics	< 110	< 110	< 110	2500	2900	..	2700	180	< 110	< 110	..	..	200	30000
Pesticides (EPA Method 8081A)	N/D	N/D	N/D	..	..	..	..	N/D	N/D	N/D	..	..	vary	vary
Cyanide	< 10	< 10	< 10	31	40	22	< 10	< 10	< 10	< 10	..	..	10	10
Physiologically Available Cyanide	..	..	..	..	..	< 10	-	..	..	..	..	..	10	10
Total Metals (PP-13&Ba)																
Arsenic	10	< 5	< 5	< 5	< 5	..	11	7.4	< 5	< 5	..	..	50	400
Barium	460	< 200	< 200	< 200	< 200	..	350	270	< 200	< 200	..	..	2000	30000
Chromium	98	< 10	< 10	< 10	< 10	..	32	32	< 10	< 10	..	..	100	2000
Copper	270	26	< 25	< 25	< 25	..	92	85	< 25	< 25	..	..	10000	100000
Lead	290 J	< 5	8.9	8.2 J	< 5 J	..	190 J	260 J	< 5 J	< 5	..	..	20	30
Mercury	1.4	< 0.2	< 0.2	< 0.2	< 0.2	..	0.72	0.48	< 0.2	< 0.2	..	..	1	1
Nickel	70	< 40	< 40	< 40	< 40	..	< 40	< 40	< 40	< 40	..	..	80	80
Zinc	400	26	< 20	< 20	< 20	..	160	210	< 20	< 20	..	..	900	900

NOTES:

1. "<" indicates analyte not detected. Value is quantitation limit. "--" indicates not tested for this analyte.
2. N/D= None of the target analytes were detected. Only compounds detected in at least one sample are shown on this table.
3. Refer to laboratory reports for full listing of target analytes.
4. RC, GW1 standards apply in Areas 1 and 2; RC, GW2 standards apply in Areas 3 and 4.
5. "J" is a data validation qualifier indicating uncertainty in quantitation; result is considered an estimate. "< H" indicates estimated nondetect.
6. Accidentally sampled nearby Tighe & Bond well MW-2 instead of CYO well 4W-1 on this date.

Table 4 (continued)
Groundwater Analytical Data: SVOCs
Historic Mill River; Northampton, MA
 Concentrations in ug/liter (ppb)

Monitoring Well: Date Collected:	Area 2			East of Area 3			Area 4			equip't. blank	Reportable	
	2W-9 7/15/03	2T-2 8/12/03	2T-3 8/12/03	3W-1 9/30/03	3W-1D 9/30/03	3W-2 9/30/03	MW-2* 7/15/03	4W-1 10/21/03	4W-5 9/30/03		Conc. RC-GW1	Conc. RC-GW2
Semivolatile Organics (SVOCs)**												
Acenaphthene	< 11 (8270)	< 11 (8270)	< 11 (8270)	68 (1111)	72 (1111)	96 (1111)	< 11 (8270)	98 (8270)	< 1.1 (1111)	< 11 (8270)	1000	5000
Acenaphthylene	< 11	< 11	< 11	1.5	1.4	12	< 11	< 10	< 1.1	< 11	20	3000
Anthracene	< 11	< 11	< 11	19	13	30	< 11	26	< 1.1	< 11	600	600
Benz(a)anthracene	< 11	< 11	< 11	5.2	< 1.1	22	< 11	< 10	< 1.1	< 11	1	3000
Benzo(a)pyrene	< 11	< 11	< 11	3.9	< 1.1	18	< 11	< 10	< 1.1	< 11	0.2	3000
Benzo(b)fluoranthene	< 11	< 11	< 11	3.7	< 1.1	16	< 11	< 10	< 1.1	< 11	1	3000
Benzo(g,h,i)perylene	< 11	< 11	< 11	2	< 1.1	8.9	< 11	< 10	< 1.1	< 11	300	3000
Benzo(k)fluoranthene	< 11	< 11	< 11	1.4	< 1.1	6.2	< 11	< 10	< 1.1	< 11	1	3000
Carbazole	< 11	< 11	< 11	..	..	..	< 11	27	..	< 11	NS	NS
Chrysene	< 11	< 11	< 11	5.1	< 1.1	16	< 11	< 10	< 1.1	< 11	2	3000
Dibenz(a,h)anthracene	< 11	< 11	< 11	< 1.1	< 1.1	2	< 11	< 10	< 1.1	< 11	0.5	3000
Dibenzofuran	< 11	< 11	< 11	..	..	..	< 11	46	..	< 11	1000	10000
Fluoranthene	< 11	< 11	< 11	21	12	69	< 11	36	< 1.1	< 11	200	200
Fluorene	< 11	< 11	< 11	37	40	53	< 11	57	< 1.1	< 11	300	3000
Indeno(1,2,3-cd)pyrene	< 11	< 11	< 11	2.1	< 1.1	8.9	< 11	< 10	< 1.1	< 11	0.5	3000
4-Methylphenol	< 11	< 11	< 11	..	..	..	< 11	< 10	..	< 11	5000	100000
2-Methylnaphthalene	< 11	< 11	< 11	36	36	83	< 11	33	< 1.1	< 11	10	3000
Naphthalene	< 11	< 11	< 11	500	680	730	< 11	320	< 1.1	< 11	20	6000
Phenanthrene	< 11	< 11	< 11	74	76	56	< 11	100	< 1.1	< 11	50	50
Pyrene	< 11	< 11	< 11	16	8.4	58	< 11	31	< 1.1	< 11	200	3000

Notes:

1. "<" indicates analyte not detected. Value is quantitation limit. "N" indicates not tested for this analyte.
2. ND= None of the target analytes were detected. Only compounds detected in at least one sample are shown on this table.
3. Refer to laboratory reports for full listing of target analytes.
4. RC, GW1 standards apply in Areas 1 and 2; RC-GW2 standards apply in Areas 3 and 4.
5. Exceedances of Reportable Concentrations are shown in bold.
6. "J" is a data validation qualifier indicating uncertainty in quantitation; result is considered an estimate. "≤ # J" indicates estimated nondetect.
7. Accidentally sampled nearby Tighe & Bond well MW-2 instead of CTO well 4W-1 on this date.
8. ** (1111) or (8270) indicates analytical method for PAH data.

Table 4 (continued)
Groundwater Analytical Data: Supplemental Inorganic Analyses
Historic Mill River, Northampton, MA
 Concentrations in ug/liter (ppb)

Area 1		Area 2										equip. blank		blank	
Monitoring Well:	1H-5	2W-9				2W-16		EB		Drill Sand		Reportable Conc.	Method 1		
Date Collected:	9/30/03	7/15/03	8/12/03	10/21/03	12/18/03	9/30/03	7/15/03	12/19/03	RC-GW1	GW-1/2/3 Standards					
Collection Method:	low flow	low flow	bailler	low flow	low flow	low flow	low flow	low flow							
Lead (unfiltered; AMRO)	29 J	290 J	5000	32 J	..	< 5 J	..	< 5	20	15					
Lead (unfiltered; Spectrum)	.	..	..	18 J	..	< 7.5	..	..	20	15
Lead (1.6 µm filtered; AMRO)	..	..	..	..	< 5	..	..	..	20	15
Lead (1.6 µm filtered; Spectrum)	..	..	..	..	< 7.5	..	..	..	20	15
Lead (0.45 µm filtered; AMRO)	< 5	..	1900	..	< 5	< 5	..	..	20	15			
Lead (0.45 µm filtered; Spectrum)	..	..	..	..	< 7.5	< 7.5	..	..	20	15
Tetraethyl Lead (unfiltered)	..	..	..	3	..	..	..	..	500	..
Mercury (unfiltered; AMRO)	0.21	1.4	..	< 0.2	..	< 0.20	< 0.20	..	1	1					
Mercury (unfiltered; Spectrum)	..	..	..	< 0.4	..	< 0.40	..	..	1	1
Mercury (0.45 µm filtered; AMRO)	< 0.20	..	..	..	..	< 0.20	..	..	1	1
Mercury (0.45 µm filtered; Spectrum)	.	..	..	..	..	< 0.40	..	..	1	1

Monitoring Well:	Area 3										Area 4										Reportable Conc. RC-GW2	GW-2/3 Standards			
	3W-2			MW-2			4W-1				4W-5			4W-6											
	Date Collected:	9/30/03	10/21/03	12/18/03	7/15/03	8/12/03	10/21/03	12/18/03	9/30/03	10/21/03	10/21/03	10/21/03	10/21/03	10/21/03											
Collection Method:	low flow	low flow	low flow	low flow	low flow	bauler	low flow	low flow	low flow	low flow	low flow	low flow	low flow	low flow	low flow	low flow	low flow	low flow	low flow	low flow	low flow	low flow	low flow	low flow	low flow
Cyanide (total)	< 10	< 10	< 10	--	< 10	--	< 10	< 10	--	--	< 10	< 10	--	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	10
Cyanide (physiologically available)	--	< 10	< 10	--	--	--	< 10	< 10	--	--	< 10	< 10	--	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	10
Lead (unfiltered; AMRC(D))	190 J	32	32	--	260 J	5700	81	57	--	--	9.1	< 7.5	--	< 5 J	< 7.5	< 7.5	< 7.5	< 7.5	< 7.5	< 7.5	< 7.5	< 7.5	< 7.5	< 7.5	30
Lead (unfiltered; Spectrum)	--	22	22	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	30
Lead (1.6 µm filtered; AMRC(D))	--	--	--	< 5	--	--	--	--	--	--	9.1	< 7.5	--	--	--	--	--	--	--	--	--	--	--	--	30
Lead (1.6 µm filtered; Spectrum)	--	--	--	< 7.5	--	--	--	--	--	--	< 7.5	< 7.5	--	--	--	--	--	--	--	--	--	--	--	--	30
Lead (0.45 µm filtered; AMRC(D))	--	--	--	< 5	--	260	--	--	--	--	< 5	< 5	--	--	--	--	--	--	--	--	--	--	--	--	30
Lead (0.45 µm filtered; Spectrum)	--	--	--	< 7.5	--	--	--	--	--	--	< 7.5	< 7.5	--	--	--	--	--	--	--	--	--	--	--	--	30
Tetraethyl Lead (unfiltered)	--	3	3	--	--	--	5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	NS

NOTES:

- 1 "≤" indicates analyte not detected. Value is quantitation limit.
- 2 "..." indicates not tested for this analyte.
3. GW 1/2/3 standards are lowest of MCLP Method 1 GW 1, GW-2 and GW-3 criteria. GW-1 criteria do not apply in Areas 3 and 4.
4. Exceedances of standards shown in bold.
5. "AMRO" and "Spectrum" indicate labs that received splits of same samples.
6. "J" is a data validation qualifier indicating uncertainty in quantitation; result is considered an estimate. "≤#J" indicates estimated nondetect.

Table 5
Soil/Sediment Samples from Current Streambed Proximate to Area 3
Historic Mill River, Northampton, MA

Sample ID	Max. Depth (feet)	Location Description	Observations/Materials Encountered
SB-1A	1.5	center of streambed	about 4" tan sand overlying black mucky organic layer
SB-1B	2	northern edge of streambed	about 1" tan sand overlying organics/roots/leaves; silt & clay at 1.5'
SB-1C	1.5	in northern bank	rich brown topsoil, leaves, roots
SB-2A	2	center of streambed by culvert	about 10" tan sand w/ coal fragments underlain by grey silt
SB-2B	1.5	northern edge of streambed	about 12" dark brown organic silt underlain by silt and slag with hydrocarbon odor
SB-2C	1.8	in northern bank	coal & slag on surface, about 1.5' topsoil/roots underlain by grey clayey silt, hydrocarbon odor
SB-3A	2	center of streambed	tan medium to coarse sand to depth
SB-3B	2	northern edge of streambed	about 12" dk. brown organic silt/roots then 6" black (fine coal?) layer, underlain by grey silt
SB-3C	2	northern limit by retaining wall	upper 1.5' rich brown organic silt/roots underlain by black material (crushed coal?) w/ HC odor
SB-4	4	approx. 20' lateral from OSS lot	grey silt to depth; swampy odor
SB-5	1	bed center, not currently in water	medium to coarse tan sand; hole would not stay open
SB-6	0.3	west bank near culvert outfall	bank reinforced with stone/rip-rap; could not advance here
SB-7	5	near 90° bend in stream	tan medium sand underlain by dark brown silt to 4'; 4-5' depth black layer w/ naphthalene odor
SB-8	5	north side of stream bed	dark brown silt/organic muck to depth; swamp odor
SB-9	4	north side of stream bed	dark brown silt/organic muck to depth; swamp odor

NOTES:

1. Samples collected by CTO on 9/10/04 and 9/20/04 using a stainless steel hand auger. Boreholes were advanced to maximum depth possible based on borehole collapse or refusal.
2. "HC" = hydrocarbon. Odor suggestive of petroleum product.
3. "OSS" = Old South Street parking lot.

Table 6
Groundwater Elevation Data
Historic Mill River; Northampton, MA

Area	Well No. (west to east)	Date	Reference Elevation (Feet)	Depth to Water (ft)	Water Table Elev. (ft)
1	1H-5	9/30/03	118.12	1.6	116.6
2	2W-9	7/15/03	120.57	5.6	115.0
		8/12/03	120.57	4.6	116.0
		10/21/03	120.57	5.6	115.0
		12/18/03	120.57	4.0	116.6
	2W-16	9/30/03	120.37	4.6	115.8
	2T-2	8/12/03	121.87	7.5	114.4
	2T-3	8/12/03	116.35	7.0	109.4
3	3W-1	9/30/03	121.27	15.6	105.7
		10/21/03	121.27	15.5	105.8
	3W-2	9/30/03	117.33	11.6	105.7
		10/21/03	117.33	11.6	105.8
		12/18/03	117.33	11.5	105.8
4	4W-5	9/30/03	121.65	13.8	107.9
		10/21/03	121.65	13.7	108.0
	MW-2	7/15/03	115.6	13.3	102.3
	4W-1	8/12/03	115.59	12.9	102.7
		10/21/03	115.59	13.4	102.2
		12/18/03	115.59	11.2	104.4

NOTES:

1. Reference point is the top of protective pipe, as shown on plans.
2. Wells are listed in linear order, west to east across study area.

Table 7
Soil Analytical Data: Area 1
Historic Mill River; Northampton, MA
Concentrations (mg/kg)

Sample No.:	1H-1	1H-2	1H-3	1H-4	Reportable Conc. (RCS-1)	DEP Background Levels in Soil
Depth (feet):	0-2'	0-2.5'	0-2'	0-1'		
% Moisture:	19%	17%	20%	19%		
Date Collected:	6/23/03	6/23/03	6/23/03	6/30/03		
EPH						
C9-C18 Aliphatics	<60	<59	<63	< 60	1000	NS
C19-C36 Aliphatics	<60	<59	<63	< 60	2500	NS
C11-C22 Aromatics	<60	<59	<63	< 60	200	NS
SVOCSs *	(1:PH)	(8270)	(1:PH)	(8270)		
Benz(a)anthracene	<0.30	<0.29	<0.31	0.77 J	0.7	9
Benzo(a)pyrene	<0.30	<0.29	<0.31	0.8 J	0.7	7
Benzo(b)fluoranthene	<0.30	<0.29	<0.31	1 J	0.7	8
Benzo(g,h,i)perylene	<0.30	<0.29	<0.31	0.62 J	1000	3
Chrysene	<0.30	<0.29	<0.31	0.75 J	7	7
Fluoranthene	<0.30	<0.29	<0.31	1.2 J	1000	10
Indeno(1,2,3-c,d)pyrene	<0.30	<0.29	<0.31	0.63 J	0.7	3
Pyrene	<0.30	<0.29	<0.31	1.3 J	700	20
Pesticides						
4,4'-DDD	--	--	--	0.049 J	2	NS
4,4' DDE	--	--	--	0.09 J	2	NS
4,4'-DDT	--	--	--	0.069 J	2	NS
PCBs						
Aroclor 1260	<0.031	<0.029	<0.031	< 0.031	2	NS
Cyanide (total)	<1.2	<1.0	<1.1	< 1.2	100	NS
Metals (total; PP13+Ba)						
Barium	<29	69	31	85	1000	50
Chromium	16	22	18	24	1000	40
Copper	16	13	7.4	32	1000	200
Lead	26	24	6.7	94	300	600
Mercury	0.099	<0.058	<0.061	0.11	20	1
Nickel	11	18	13	17	300	30
Zinc	40	37	19	66	2500	300

Notes:

1. Concentrations reported in mg/kg on a dry weight basis.
 2. ND=Not detected. Only compounds detected in at least one sample are shown here. Refer to laboratory reports for full listing of target analytes.
 3. "--" indicates not tested for this analyte. "<" indicates not detected; value is sample quantitation limit (shown for duplicate comparison purposes).
 4. J – validation qualifier indicating an estimated value. "<#J" indicates estimated detection limit.
 5. Standards are lower of MCP Method 1 S-1/GW-2 and S-1/GW-3 criteria.
 6. Background levels for soil containing coal ash or wood ash from "Technical Update: Background Levels of Polycyclic Aromatic Hydrocarbons and Metals in Soil" MADEP, 5/23/02.
- * (EPH) or (8270) indicates analytical method for PAH data.

Table 8

Soil Analytical Data: Area 2
Historic Mill River, Northampton, MA
 Concentrations (mg/kg)

Sample No.:	2H-1	2H-2	2H-3	2H-4	2H-5	2H-6	2H-7	2W-9	2B-10	2B-11	Reportable Conc. (RCS-1)	DEP Background Levels in Soil
Depth (feet):	0-6'	0-6'	0-4'	0-3.5'	0-3.5'	0-5.5'	0-4'	0-8'	0-8'	0-8'		
% Moisture:	21%	20%	14%	13%	16%	19%	17%	18%	21%	14%		
Date Collected:	6/10/03	6/10/03	6/10/03	6/10/03	6/10/03	6/10/03	6/10/03	6/27/03	6/27/03	6/27/03		
EPH												
C9-C18 Aliphatics	< 63	< 61	< 56	< 55	< 57	< 59	< 58	< 60	< 63	< 56	1000	NS
C19-C36 Aliphatics	< 63	< 61	< 56	< 55	< 57	< 59	< 58	< 60	< 63	< 56	2500	NS
C11-C22 Aromatics	< 63	< 61	< 56	< 55	87	< 59	66	< 60	< 63	< 56	200	NS
SVOCSs *												
	(EPII)	(8270)	(EPII)	(8270)	(EPII)	(8270)	(8270)	(EPII)	(EPII)	(8270)		
Acenaphthylene	< 0.32	< 0.30	< 0.28	< 0.28	0.58	< 0.31	0.47	< 0.3	< 0.31	< 0.29 J	100	1
Anthracene	< 0.32	< 0.30	< 0.28	< 0.28	0.97	< 0.31	0.51	0.34	< 0.31	< 0.29 J	1000	4
Benz(a)anthracene	0.37 J	0.6	0.68	0.87	2.4	0.88	1.4	0.88	< 0.31	< 0.29 J	0.7	9
Benzo(a)pyrene	0.43 J	0.63	1	0.97	3.3	0.96	1.5	0.81	< 0.31	< 0.29 J	0.7	7
Benzo(b)fluoranthene	0.54 J	0.93	1.1	1.3	4	1.2	2.0	1.1	< 0.31	< 0.29 J	0.7	8
Benzo(g,h,i)perylene	< 0.32	0.46	0.75	0.73	2.3	0.69	1.1	0.49	< 0.31	< 0.29 J	1000	3
Benzo(k)fluoranthene	< 0.32	0.32	0.61	0.41	1.7	0.38	0.71	0.11	< 0.31	< 0.29 J	7	4
Chrysene	0.44 J	0.74	1.2	0.85	2.7	0.84	1.6	0.92	< 0.31	< 0.29 J	7	7
Dibenz(a,h)anthracene	< 0.32	< 0.30	< 0.28	< 0.28	0.57	< 0.31	0.3	< 0.3	< 0.31	< 0.29 J	0.7	1
Dibenzofuran	--	< 0.30		< 0.28	--	< 0.31	< 0.29	--		< 0.29 J	100	NS
Fluoranthene	1.3 J	1.3	1.4	1.5	5.4	1.8	3.0	1.9	< 0.31	< 0.29 J	1000	10
Indeno(1,2,3-c,d)pyrene	< 0.32	0.54	0.81	0.83	2.6	0.78	1.2	0.55	< 0.31	< 0.29 J	0.7	3
4-Methylphenol		< 0.30	--	< 0.28	--	< 0.31	< 0.29	--	--	< 0.29 J	500	1
Phenanthrene	< 0.32	0.65	0.36	0.6	2	0.88	1.5	1.4	< 0.31	< 0.29 J	100	20
Pyrene	0.95 J	1.2	1.5	1.6	4.7	1.6	2.7	1.6	< 0.31	< 0.29 J	700	20
Pesticides												
alpha-Chlordane	--	--	--	< 0.0009		--	0.016 J	--	< 0.001	--	1	NS
gamma-Chlordane	--	--	--	< 0.0009	--	--	0.014 J	--	< 0.001	--	1	NS
4,4'-DDE	--	--	--	0.0047 J	--		0.09 J	--	< 0.002	--	2	NS
4,4'-DDE	--	--	--	0.0042 J	--	--	0.043 J	--	< 0.002	--	2	NS
1,1'-DDE	--	--	--	0.0047 J	--	--	0.044 J	--	< 0.002	--	2	NS
PCBs												
Aroclor 1260	< 0.031	< 0.03	< 0.028	< 0.028	< 0.029	< 0.03	0.035	< 0.031	< 0.032	< 0.029	2	NS
Cyanide (total)	< 1.1	< 1.1	< 1.1	< 1.1	< 1.0	< 1.2	< 1.2	< 1.2	< 1.2	< 0.98	100	NS
Metals (PP13+Ba)												
Arsenic	< 7.6	18	< 6.8	< 7.1	7	11	18	< 7	< 7.6	< 6.9	30	20
Barium	32	85	71	77	66	120	160	35	46	< 28	1000	50
Cadmium	< 0.76	< 0.78	< 0.68	< 0.71	< 0.68	< 0.72	0.99	< 0.7	< 0.76	< 0.69	30	3
Chromium	91	89	15	24	25	20	21	60	21	23	1000	40
Copper	53	50	6.8	15	16	90	56	62	12	22	1000	200
Lead	39	93	13	23	110	340	270	67	6.1	40	300	600
Mercury	0.29	0.28	< 0.055	< 0.056	< 0.056	0.74	0.2	0.22	< 0.06	0.1	20	1
Nickel	14	17	15	20	22	15	24	17	16	10	300	30
Zinc	75	150	32	36	98	160	250	97	33	53	2500	300

Notes:

- Concentrations reported in mg/kg on a dry weight basis.
- ND=Not detected. Only compounds detected in at least one sample are shown here. Refer to laboratory reports for full listing of target analytes.
- "--" indicates not tested for this analyte. "<" indicates not detected; value is sample quantitation limit (shown for duplicate comparison purposes).
- J = validation qualifier indicating an estimated value. "<#J" indicates estimated detection limit.
- Standards are lower of MCP Method 1 S-1/GW-2 and S-1/GW-3 criteria.
- Background levels for soil containing coal ash or wood ash from "Technical Update: Background Levels of Polycyclic Aromatic Hydrocarbons and Metals in Soil" MADEP, 5/23/02.
- (EPII) or (8270) indicates analytical method for PAH data.

Table 8 (continued)
Soil Analytical Data: Area 2
Historic Mill River; Northampton, MA
Concentrations (mg/kg)

Sample No.:	2B-12	2B-13	2B-14	2B-15	2T-1	2T-2	2T-3	2W-16	Reportable Conc. (RCS-1)	DEP Background Levels in Soil
Depth (feet):	0-8'	0-6'	0-8'	0-10'	12-16'	8-11'	4-8'	0-4'		
% Moisture:	21%	16%	23%	24%	23%	17%	13%	20%		
Date Collected:	6/27/03	6/27/03	6/27/03	6/27/03	7/30/03	7/30/03	7/30/03	9/18/03		
EPH										
C9-C18 Aliphatics	< 61	< 58	< 62	< 63	< 64	< 60	< 56	< 62	1000	NS
C19-C36 Aliphatics	< 61	< 58	< 62	< 63	< 64	< 60	< 56	< 62	2500	NS
C11-C22 Aromatics	< 61	< 58	< 62	< 63	< 64	< 60	< 56	< 62	200	NS
SVOCs *	(8270)	(EPII)	(8270)	(8270)	(8270)	(EPII)	(EPII)	(EPII)		
Acenaphthylene	< 0.31 J	< 0.29	0.32 J	< 0.33 J	< 0.32	< 0.30	< 0.28	< 0.31	100	1
Anthracene	< 0.31 J	< 0.29	0.66 J	< 0.33 J	< 0.32	< 0.30	< 0.28	< 0.31	1000	4
Benzo(a)anthracene	< 0.31 J	< 0.29	2.7 J	< 0.33 J	0.87	0.37	< 0.28	< 0.31	0.7	9
Benzo(a)pyrene	< 0.31 J	< 0.29	2.7 J	< 0.33 J	0.84	0.41	< 0.28	< 0.31	0.7	7
Benzo(b)fluoranthene	< 0.31 J	< 0.29	3.3 J	< 0.33 J	1.1	0.54	< 0.28	< 0.31	0.7	8
Benzo(g,h,i)perylene	< 0.31 J	< 0.29	1.6 J	< 0.33 J	0.57	< 0.30	< 0.28	< 0.31	1000	3
Benzo(k)fluoranthene	< 0.31 J	< 0.29	1.1 J	< 0.33 J	0.39	< 0.30	< 0.28	< 0.31	7	4
Chrysene	< 0.31 J	< 0.29	2.6 J	< 0.33 J	0.9	0.41	< 0.28	< 0.31	7	7
Dibenz(a,h)anthracene	< 0.31 J	< 0.29	0.41 J	< 0.33 J	< 0.32	< 0.30	< 0.28	< 0.31	0.7	1
Fluoranthene	0.39 J	0.3	5.4 J	< 0.33 J	1.7	0.81	< 0.28	< 0.31	1000	10
Indeno(1,2,3-c,d)pyrene	< 0.31 J	< 0.29	1.7 J	< 0.33 J	0.63	< 0.30	< 0.28	< 0.31	0.7	3
Phenanthrene	< 0.31 J	< 0.29	2.4 J	< 0.33 J	1	0.43	< 0.28	< 0.31	100	20
Pyrene	0.33 J	< 0.29	5.1 J	< 0.33 J	1.6	0.7	< 0.28	< 0.31	700	20
Pesticides										
4,4'-DDT	--	0.0021 J	--	--	< 0.002	--	--	--	2	NS
PCBs										
Aroclor 1260	< 0.032	< 0.030	< 0.032	< 0.033	< 0.031	< 0.030	< 0.028	--	2	NS
Cyanide (total)	< 1.2	< 1.1	< 1.3	< 1.3	< 1.4	< 1.2	< 1.1	--	100	NS
Metals (PP13+Ba)										
Antimony	< 6.2	< 5.5	< 6.1	< 6.2	< 5.8	< 5.8	< 5.6	< 6.2	10	7
Arsenic	< 7.7	< 6.9	< 7.7	< 7.7	< 7.2	< 7.3	< 7.0	< 7.8	30	20
Barium	< 31	31	92	60	56	45	88	54	1000	50
Chromium	21	74	27	25	33	110	27	19	1000	40
Copper	19	41	38	32	65	64	11	14	1000	200
Lead	59	33	40	28	99	49	10	11	300	600
Mercury	0.068	0.095	0.61	0.2	0.23	0.23	< 0.054	< 0.062	20	1
Nickel	8.8	13	20	18	17	19	20	15	300	30
Zinc	40	79	85	57	140	160	26	41	2500	300

Notes:

- Concentrations reported in mg/kg on a dry weight basis.
- ND=Not detected. Only compounds detected in at least one sample are shown here. Refer to laboratory reports for full listing of target analytes.
- indicates not tested for this analyte. "<" indicates not detected; value is sample quantitation limit (shown for duplicate comparison purposes).
- J = validation qualifier indicating an estimated value. "<#J" indicates estimated detection limit.
- Standards are lower of MCP Method 1 S-1/GW-2 and S-1/GW-3 criteria.
- Background levels for soil containing coal ash or wood ash from "Technical Update: Background Levels of Polycyclic Aromatic Hydrocarbons and Metals in Soil" MADEP, 5/23/02.
- (EPH) or (8270) indicates analytical method for PAH data.

Table 9
Soil Analytical Data: Area 3
Historic Mill River, Northampton, MA
 Concentrations (mg/kg)

Sample No.:	duplicate		duplicate		Re-analysis		Trip Blank	Reportable Conc. (RCS-1)	DEP Background Levels in Soil	S-1 GW-2/3 Standards
	3W-1	3W-1	3W-1D	3W-2	3W-2	WC-30				
Depth (feet):	4-6'	16-18'	16-18'	7-9'	19-21'	22-24'	--			
% Moisture:	6%	16%	15%	8%	22%	13%	--			
Date Collected:	9/18/03	9/18/03	9/18/03	9/18/03	9/18/03	10/13/03	9/18/03			
VOCs										
Benzene	--	--	--	--	0.25	64	< 0.025	10	NS	40
2-Butanone	--	--	--	--	< 0.87	--	0.25	0.3	NS	40
Ethylbenzene	--	--	--	--	1.1	170	< 0.025	500	NS	500
Isopropylbenzene	--	--	--	--	0.21	--	< 0.025	1000	NS	NS
1-Isopropyltoluene	--	--	--	--	0.15	--	< 0.025	NS	NS	NS
Toluene	--	--	--	--	0.15	150	< 0.025	90	NS	500
1,2,4-Trimethylbenzene	--	--	--	--	1.4	--	< 0.025	1000	NS	NS
1,3,5-Trimethylbenzene	--	--	--	--	0.46	--	< 0.025	10	NS	NS
Naphthalene	--	--	--	--	34	6200	< 0.050	4	NS	100
Nylenes (total)	--	--	--	--	0.91	340	< 0.025	500	NS	500
VPH										
C3-C8 Aliphatics	--	--	--	--	< 87	< 160	< 2.5	100	NS	100
C9-C12 Aliphatics	--	--	--	--	< 22	130	< 0.62	1000	NS	1000
C9-C10 Aromatics	--	--	--	--	< 22	1200	< 0.62	100	NS	100
EPH										
C9-C18 Aliphatics	< 53	< 59	< 59	< 54	< 63	250	--	1000	NS	1000
C19-C36 Aliphatics	110	< 59	61	< 54	< 63	130	--	2500	NS	2500
C11-C22 Aromatics	210	< 59	140	70	420	30000	--	200	NS	800
SVOCs *										
	(EPII)	(8270)	(8270)	(EPII)	(8270)	(EPII)	(8270)			
Acenaphthene	1.1	0.56 J	2.1 J	< 0.27	15	240	140	20	2	1000
Acenaphthylene	0.31	< 0.3 J	< 0.29 J	0.74	3	620	280	100	1	100
Anthracene	4.7	2 J	6.4 J	1.2	14	480	220	1000	4	1000
Benzo(a)anthracene	12	4.1 J	7.5 J	5.1	13	350	190	0.7	9	0.7
Benzo(a)pyrene	14	3.5 J	6.3 J	5.7	11	280	150	0.7	7	0.7
Benzo(b)fluoranthene	15	4.5 J	8 J	7.1	12	320	170	0.7	8	0.7
Benzo(g,h,i)perylene	9.4	2 J	3.5 J	4.7	5.2	100	79	1000	3	1000
Benzo(k)fluoranthene	5.1	1.7 J	2.6 J	2.2	3.5	110	44	7	4	7
Carbazole	--	0.54 J	1.4 J	--	1.4	--	81	NS	NS	NS
Chrysene	10	3.7 J	6.6 J	5.4	10	260	130	7	7	7
Dibenz(a,b)anthracene	2.6	0.56 J	0.97 J	1.1	1.3	13	21	0.7	1	0.7
Dibenzofuran	--	0.51 J	2.1 J	--	6.5	--	200	100	NS	NS
2,4-Dimethylphenol	--	< 0.3 J	< 0.29 J	--	< 0.32	--	2.9	0.7	NS	10
Fluoranthene	26	10 J	18 J	11	29	880	490	1000	10	1000
Fluorene	1.2	0.84 J	2.9 J	0.4	12	480	240	400	2	1000
Indeno(1,2,3-c,d)pyrene	11	2.3 J	3.9 J	4.8	5.8	130	88	0.7	3	0.7
2-Methylnaphthalene	< 0.26	< 0.3 J	0.81 J	< 0.27	6.5	850	420	4	1	500
4-Methylphenol	--	< 0.3 J	< 0.29 J	--	< 0.32	--	< 2.8	500	NS	NS
Naphthalene	< 0.26	0.4 J	0.77 J	< 0.27	17	3900	1980	4	1	100
Phenanthrene	20	8.3 J	20 J	4.6	45	1500	860	100	20	100
Pyrene	23	8.4 J	16 J	8.9	28	730	420	700	20	700
Cyanide (total)	< 0.98	< 1.1	< 1	--	< 1.3	< 1.1	--	100	NS	100
Metals (PP-13 + Ba)										
Barium	45	64	70	--	< 32	41	--	1000	50	1000
Chromium	16	20	19	--	22	15	--	1000	40	1000
Copper	28	31	22	--	24	9.2	--	1000	200	NS
Lead	32	44	39	--	38	8.3	--	300	600	300
Mercury	< 0.052	< 0.059 J	0.2 J	--	< 0.063	< 0.056	--	20	1	20
Nickel	16	17	15	--	10	11	--	300	30	300
Selenium	< 10	< 11	< 11	--	< 13	< 11	--	400	1	400
Silver	< 1.8	< 1.9	< 2	--	< 2.2	< 1.9	--	100	5	100
Thallium	< 0.63	< 0.69	< 7.1	--	< 0.79	< 6.9 J	--	8	5	8
Zinc	45	51	49	--	41	19	--	2500	300	2500

Notes

- Concentrations reported in mg/kg on a dry weight basis.
- indicates not tested for this analyte; "<" indicates not detected, value is sample specific quantitation limit. ND=None of the analytes were detected.
- Only compounds detected in at least one sample are shown here. Refer to laboratory reports for full listing of target analytes.
- J = validation qualifier indicating an estimated value. "<4J" indicates estimated detection limit.
- Standards are lower of MCP Method 1 S-1 GW-2 and S-1 GW-3 criteria. Exceedances of standards shown in bold.
- Background levels for soil containing coal ash or wood ash from "Background Levels of Polycyclic Aromatic Hydrocarbons and Metals in Soil" MMDLP, 5-23-02.
- (EPII) or (8270) indicates analytical method used to generate PALL data.

Table 9 (continued)
Soil Analytical Data: Area 3
Characteristics for Drummed Material (Well 3W-2)
Historic Mill River; Northampton, MA

Sample No.:	Drum
Date Collected:	9/18/03
Reactivity (mg/kg)	
Reactive Cyanide	< 23
Reactive Sulfide	< 110
TCLP-SVOCs	ND
TCLP-Metals (mg/l)	
Arsenic	< 0.25
Barium	< 2
Cadmium	< 0.05
Chromium	< 0.1
Lead	0.29
Mercury	< 0.001
Selenium	< 0.4
Silver	< 0.07

NOTES:

Characteristics testing performed for disposal purposes.

Table 10
Stream Bed Sample Analytical Data: Area 3
Northampton Mill River Project
Concentrations (mg/kg)

Location:	SB-7	WC-30	3W-2	Method 1	Upper
Depth (feet):	4-4.5	22-24	19-21	S-1/GW-2,3	Conc.
% Moisture:	35%	13%	22%	Standards	Limits
Date Collected:	9/20/04	10/13/03	9/18/03		(UCLS)
Volatile Petroleum Hydrocarbons (VPH)					
C5-C8 Aliphatic Hydrocarbons	< 47	< 160	< 87	100	5000
C9-C12 Aliphatic Hydrocarbons	28	130	< 22	1000	20000
C9-C10 Aromatic Hydrocarbons	39	1200	< 22	100	5000
Benzene	< 0.95	64	0.25	40	2000
Toluene	< 0.95	150	0.15	500	10000
Ethylbenzene	< 0.95	170	1.1	500	10000
Xylenes (total)	3.2	340	0.91	500	10000
Naphthalene	360	6200	34	100	10000
Extractable Petroleum Hydrocarbons (EPH)					
C9-C18 Aliphatic Hydrocarbons	< 750	250	< 63	1000	20000
C19-C36 Aliphatic Hydrocarbons	< 750	130	< 63	2500	20000
C11-C22 Aromatic Hydrocarbons	5000	30000	420	800	10000
Acenaphthene	410	240	--	1000	10000
Acenaphthylene	210	620	--	100	10000
Anthracene	730	480	--	1000	10000
Benz(a)anthracene	380	370	--	0.7	100
Benzo(a)pyrene	330	280	--	0.7	100
Benzo(b)fluoranthene	330	320	--	0.7	100
Benzo(g,h,i)perylene	170	100	--	1000	10000
Benzo(k)fluoranthene	130	110	--	7	400
Chrysene	370	260	--	7	400
Dibenz(a,h)anthracene	37	13	--	0.7	100
Fluoranthene	1000	880	--	1000	10000
Fluorene	400	480	--	1000	10000
Indeno(1,2,3-cd)pyrene	210	130	--	0.7	100
2-Methylnaphthalene	380	850	--	500	10000
Naphthalene	830	3900	--	100	10000
Phenanthrene	1600	1500	--	100	10000
Pyrene	870	730	--	700	10000
Semivolatile Organic Compounds (SVOCs by 8270)					
Acenaphthene	190	140	15	1000	10000
Acenaphthylene	94	280	3	100	10000
Anthracene	300	220	14	1000	10000
Benz(a)anthracene	180	190	13	0.7	100
Benzo(a)pyrene	150	150	11	0.7	100
Benzo(b)fluoranthene	160	170	12	0.7	100
Benzo(g,h,i)perylene	83	79	5.2	1000	10000
Benzo(k)fluoranthene	48	44	3.5	7	400
Carbazole	50	81	1.4	NS	NS
Chrysene	160	130	10	7	400
Dibenz(a,h)anthracene	4.4	21	1.3	0.7	100
Dibenzofuran	120	200	6.5	NS	NS
2,4-Dimethylphenol	< 0.38	2.9	< 0.32		
Fluoranthene	460	490	29	1000	10000
Fluorene	180	240	12	1000	10000
Indeno(1,2,3-cd)pyrene	89	88	5.8	0.7	100
2-Methylnaphthalene	150	420	6.5	500	10000
4-Methylphenol	0.44	< 2.8	< 0.32	NS	NS
Naphthalene	290	1900	17	100	10000
Phenanthrene	770	860	45	100	10000
Pyrene	420	420	28	700	10000

NOTES:

- Bold** indicates exceeds S-1/GW-2,3 soil standard. **Bold italics** indicate exceeds S-1 standard and UCL.
- NS = No Standard for this compound. "<" = Not detected. Value is sample specific quantitation limit.

Table II
Soil Analytical Data: Area 4
Historic Mill River, Northampton, MA

Concentrations (mg/kg)

Sample No./ Depth (feet)/ % Moisture/ Date Collected	4B-1 5-7' 13%	4B-1 14-16' 17%	4B-2 6-8' 12%	4B-2 14-16' 17%	4B-3 14-16' 27%	4W-1 6-8' 7%	4W-1 16-18' 14%	4H-1 0-2' 31%	4H-5D 0-2' 33%	4H-6 0.5-1' 16%	4W-5 14-16' 4%	Rep Blank	Reportable Conc. (RCS-I)	DEP Background Levels in Soil	S-1 GW-2/3 Standards
VOCs by 8260															
Naphthalene	..	..	..	..	..	..	0.56	..	..	..	..	< 0.005	4	NS	100
VPH Hydrocarbons	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
VPH Target Analytes	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
EPH Hydrocarbons															
C9-C18 Aliphatics	< 55	< 60	< 56	< 59	< 68	< 52	< 57	< 72	< 74	< 59	..	..	..	..	1000
C19-C36 Aliphatics	< 55	< 60	< 56	< 59	< 68	220	< 57	160	120	< 59	..	..	2500	NS	2500
C11-C22 Aromatics	< 55	< 60	< 56	< 59	< 68	700	1600	360	350	140	..	..	200	NS	800
EPH Target Analytes															
Acenaphthene	< 0.28	< 0.30	< 0.28	< 0.30	< 0.34	5.4	28	1.1	..	0.5	..	..	20	2	1000
Acenaphthylene	< 0.28	< 0.30	< 0.28	< 0.30	< 0.34	3	1.1	2	..	0.77	..	..	100	1	100
Anthracene	< 0.28	< 0.30	< 0.28	< 0.30	< 0.34	16	61	2.9	..	3.9	..	..	1000	4	1000
Benzo(a)anthracene	0.51	0.43	0.59	< 0.30	< 0.34	12	49	7.5	..	7.5	..	..	0.7	9	0.7
Benzo(a)pyrene	0.45	0.44	0.49	< 0.30	< 0.34	7.9	37	8.8	..	6.5	..	..	0.7	7	0.7
Benzo(b)fluoranthene	0.58	0.48	0.56	< 0.30	< 0.34	12	47	11	..	7.6	..	..	0.7	8	0.7
Benzo(g,h,i)perylene	0.32	< 0.30	< 0.28	< 0.30	< 0.34	2.6	23	6.3	..	3.9	..	..	1000	3	1000
Benzo(k)fluoranthene	0.3	< 0.30	0.85	< 0.30	< 0.34	3.9	16	4.1	..	2.5	..	..	7	4	7
Chrysene	0.56	0.46	0.58	< 0.30	< 0.34	11	46	8.5	..	6.1	..	..	7	7	7
Dibenz(a,b)anthracene	< 0.28	< 0.30	< 0.28	< 0.30	< 0.34	0.96	8.5	1.5	..	1	..	..	0.7	1	0.7
Fluoranthene	1.2	0.84	1.3	< 0.30	< 0.34	33	140	16	..	15	..	..	1000	10	1000
Fluorene	< 0.28	< 0.30	< 0.28	< 0.30	< 0.34	9	37	0.65	..	0.89	..	..	400	2	1000
Indeno(1,2,3-c,d)pyrene	0.34	< 0.30	0.33	< 0.30	< 0.34	3.6	28	7.2	..	4.4	..	..	0.7	3	0.7
2-Methylnaphthalene	< 0.28	< 0.30	< 0.28	< 0.30	< 0.34	4.6	28	< 0.36	..	< 0.29	..	..	4	1	500
Naphthalene	< 0.28	< 0.30	< 0.28	< 0.30	< 0.34	8.7	62	0.45	..	0.66	..	..	4	1	100
Phenanthrene	0.5	< 0.30	0.49	< 0.30	< 0.34	38	180	7.7	..	8.2	..	..	100	20	100
Pyrene	0.93	0.76	1.1	< 0.30	< 0.34	21	110	15	..	12	..	..	700	20	700
SVOCs by 8270															
Acenaphthene	< 0.27	< 0.29	..	..	..	2.2	12	0.67	..	..	< 0.26	..	20	2	1000
Acenaphthylene	< 0.27	< 0.29	..	..	..	3.2	1.3	2.2	..	..	< 0.26	..	100	1	100
Anthracene	0.49	< 0.29	..	..	..	11	23	2.5	..	..	< 0.26	..	1000	4	1000
Benzo(a)anthracene	1.7	0.7	..	..	..	8.4	20	6.7	..	..	< 0.26	..	0.7	9	0.7
Benzo(a)pyrene	1.6	0.68	..	..	..	5.9	17	7.7	..	..	< 0.26	..	0.7	7	0.7
Benzo(b)fluoranthene	2	0.72	..	..	..	9.6	21	9.4	..	..	< 0.26	..	0.7	8	0.7

Notes:

1. Concentrations reported in mg/kg on a dry weight basis.
2. " " indicates not tested for this analyte. " " indicates not detected, value is sample specific quantitation limit. ND= None of the analytes were detected.
3. Only compounds detected in at least one sample are shown here. Refer to laboratory reports for full listing of target analytes.
4. " " indicates estimated detection limit.
5. Standards are lower of MCP Method 1 S-1 (GW-2 and S-1) (GW-1) (GW-2) (GW-3) (GW-4) (GW-5) (GW-6) (GW-7) (GW-8) (GW-9) (GW-10) (GW-11) (GW-12) (GW-13) (GW-14) (GW-15) (GW-16) (GW-17) (GW-18) (GW-19) (GW-20) (GW-21) (GW-22) (GW-23) (GW-24) (GW-25) (GW-26) (GW-27) (GW-28) (GW-29) (GW-30) (GW-31) (GW-32) (GW-33) (GW-34) (GW-35) (GW-36) (GW-37) (GW-38) (GW-39) (GW-40) (GW-41) (GW-42) (GW-43) (GW-44) (GW-45) (GW-46) (GW-47) (GW-48) (GW-49) (GW-50) (GW-51) (GW-52) (GW-53) (GW-54) (GW-55) (GW-56) (GW-57) (GW-58) (GW-59) (GW-60) (GW-61) (GW-62) (GW-63) (GW-64) (GW-65) (GW-66) (GW-67) (GW-68) (GW-69) (GW-70) (GW-71) (GW-72) (GW-73) (GW-74) (GW-75) (GW-76) (GW-77) (GW-78) (GW-79) (GW-80) (GW-81) (GW-82) (GW-83) (GW-84) (GW-85) (GW-86) (GW-87) (GW-88) (GW-89) (GW-90) (GW-91) (GW-92) (GW-93) (GW-94) (GW-95) (GW-96) (GW-97) (GW-98) (GW-99) (GW-100) (GW-101) (GW-102) (GW-103) (GW-104) (GW-105) (GW-106) (GW-107) (GW-108) (GW-109) (GW-110) (GW-111) (GW-112) (GW-113) (GW-114) (GW-115) (GW-116) (GW-117) 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Table II (continued)
Soil Analytical Data: Area 4
Historic Mill River, Northampton, MA

Concentrations (mg/kg)
duplicate

Sample No.	4B-1	4B-1	4B-2	4B-2	4B-3	4W-1	4W-1	4I1-5	4H-5D	4I1-6	4W-5	Trip	Blank	Reportable Conc. (RCS-I)	DEP Background Levels in Soil	S-1 GW-2/3 Standards
Depth (feet)	5-7'	14-16'	6-8"	14-16'	14-16'	6-8"	16-18"	0-2'	0-2'	0.5-1'	14-16'	6/4/03	6/4/03	6/4/03		
% Moisture	13%	17%	12%	17%	27%	7%	14%	31%	33%	16%	4%	6/4/03	6/4/03	6/4/03		
Date Collected	6/4/03	6/4/03	6/4/03	6/4/03	6/4/03	6/4/03	6/4/03	6/10/03	6/10/03	10/14/03	9/18/03	6/4/03	6/4/03			
SVOCs (continued)																
Benzofluoranthene	1	0.37	--	--	--	3.8	10	6.2	--	--	< 0.26	--	--	1000	3	1000
Benzofluoranthene	0.66	0.3	--	--	--	2.4	6.6	3.2	--	--	< 0.26	--	--	7	4	7
Carbazole	< 0.27	< 0.29	--	--	--	2.1	8.8	0.61	--	--	< 0.26	--	--	NS	NS	NS
Chrysene	1.6	0.63	--	--	--	8	18	7.6	--	--	< 0.26	--	--	7	7	7
Dibenz(a,h)anthracene	0.28	< 0.29	--	--	--	1.3	3	1.5	--	--	< 0.26	--	--	0.7	1	0.7
Dibenzofuran	< 0.27	< 0.29	--	--	--	2.4	15	< 0.36	--	--	< 0.26	--	--	100	NS	NS
Fluoranthene	3.5	1.1	--	--	--	2.4	56	15	--	--	< 0.26	--	--	1000	10	1000
Fluorene	< 0.27	< 0.29	--	--	--	3.6	18	0.69	--	--	< 0.26	--	--	400	2	1000
Indeno(1,2,3-cd)pyrene	1.2	0.43	--	--	--	4.5	12	6.3	--	--	< 0.26	--	--	0.7	3	0.7
4-Methylphenol	< 0.27	< 0.29	--	--	--	< 0.36	0.29	< 0.36	--	--	< 0.26	--	--	500	1	NS
2-Methylnaphthalene	< 0.27	< 0.29	--	--	--	2.1	12	< 0.36	--	--	< 0.26	--	--	4	NS	500
Naphthalene	< 0.27	< 0.29	--	--	--	3	30	0.51	--	--	< 0.26	--	--	4	1	100
Phenanthrene	2	< 0.29	--	--	--	20	85	6.6	--	--	< 0.26	--	--	100	20	100
Pyrene	3	1.1	--	--	--	17	45	15	--	--	< 0.26	--	--	700	20	700
Pesticides																
α-Chlordane	--	--	--	--	--	--	< 0.0009	0.013	--	--	--	--	--	1	NS	1
4,4'-DDE	--	--	--	--	--	--	< 0.0018	0.21	--	--	--	--	--	2	NS	2
4,4'-DDD	--	--	--	--	--	--	< 0.0018	0.026	--	--	--	--	--	2	NS	2
4,4'-DDD	--	--	--	--	--	--	< 0.0018	0.061	--	--	--	--	--	2	NS	2
Indrin aldehyde	--	--	--	--	--	--	0.034	< 0.0022	--	--	--	--	--	10	NS	NS
PCBs																
Aroclor 1260	< 0.028	< 0.030	< 0.028	< 0.030	< 0.033	< 0.027	< 0.028	0.13	0.15	--	--	--	--	2	NS	2
Cyanide (total)	< 1.1	< 1	< 1.1	< 1.1	< 1.1	< 1.1	< 1	< 1.4	< 1.3	< 0.93	< 0.92	--	--	100	NS	100
Metals (total PP13+Ba)																
Arsenic	< 7	< 7.1	< 6.8	< 7	< 7.9	< 6.4	< 7.3	10	10	< 6.8	< 6.4	--	--	30	20	30
Barium	47	48	39	50	93	31	77	87	88	30	< 26	--	--	1000	50	1000
Cadmium	< 0.7	< 0.71	< 0.68	< 0.7	< 0.79	< 0.64	< 0.73	< 0.83	0.89	< 0.68	< 0.64	--	--	30	3	30
Chromium	17	16	17	14	28	16	22	27	27	16	7.1	--	--	1000	40	1000
Copper	50	19	20	5.7	13	67	18	59	61	26	4.7	--	--	1000	200	NS
Lead	68	23	39	< 3.5	7	210	78	260	310	47	< 3.2	--	--	300	600	300
Mercury	0.065	0.063	0.16	< 0.059	< 0.065	0.075	0.084	0.29	0.20	0.098	< 0.049	--	--	20	1	20
Nickel	13	11	13	11	21	18	17	21	20	10	7.5	--	--	300	30	300
Selenium	< 11	< 11	< 11	< 11	< 13	< 10	< 12	< 13	< 14	< 11	< 10	--	--	400	1	400
Silver	< 1.9	< 2	< 1.9	< 2	< 2.2	< 1.8	< 2	< 2.3	< 2.4	< 1.9	< 1.8	--	--	100	5	100
Thallium	< 7	< 7.1	< 6.8	< 7	< 7.9	< 6.4	< 7.3	< 8.3	< 8.5	< 6.8	< 6.4	--	--	8	5	8
Zinc	54	37	38	27	53	44	64	170	200	140	12	--	--	2500	300	2500

Notes

1. Concentrations reported in mg/kg on a dry weight basis.
2. "n" indicates not tested for this analyte. "n.d." indicates not detected; value is sample specific quantitation limit. ND= None of the analytes were detected.
3. Only compounds detected in at least one sample are shown here. Refer to laboratory reports for full listing of target analytes.
4. J = validation qualifier indicating an estimated value. "%, #]" indicates estimated detection limit.
5. Standard, at, lower of MCP Method 1, S. 1, CW, 2 and S. 1, CW, 3 criteria. Exceedances of Standards shown in bold.

Table 11 (continued)
Soil Analytical Data: Area 4
Tentatively Identified Compounds (TICs)
Historic Mill River, Northampton, MA

Sample No.:	4W-1
Depth:	16-18'
Date Collected:	6/4/03
SVOC TICs by Method 8270C	Estimated Conc. (mg/kg)
Unknown aldol condensation product	2.2
Unknown aldol condensation product	31
1-Methyl naphthalene	9.2
Biphenyl	2.2
Ethyl naphthalene isomer	1
Dimethyl naphthalene isomer	2.4
Dimethyl naphthalene isomer	3.2
Dimethyl naphthalene isomer	1.7
Dimethyl naphthalene isomer	2
Trimethyl naphthalene isomer	0.96
Trimethyl naphthalene isomer	0.9
Trimethyl naphthalene isomer	0.84
2,4a-Dihydrofluorene	1.2
4-Methyl dibenzofuran	2.7
Methyl pyrene isomer	0.65
Benz(c)acephenanthrylene	6.7
Benzo(c)pyrene	18
Unknown	2.3
Unknown PAH	4.4
Pentaphene	4.8
Benzo(b)triphenylene	4.5
Dibenzo(def,mno)chrysene	5.7

NOTES:

Concentrations for tentatively identified compounds are estimated based on an assumed instrument response factor of 1.0, and should not be interpreted as hard quantitative values.

Table 12
Soil Sample Microscopy Results
Historic Mill River, Northampton, MA

Location No.	Depth	Microscopy Results
2B-14	6-8'	anthracite and bituminous coal (light to moderate amount) wood ash (trace amount)
3W-1	10-12'	heavily tarred asphalt*
3W-2	19-21'	coal (light amount) asphalt* (light amount) coal ash (trace)
SB-7	4-4.5'	bituminous coal (light amount) coal ash (light amount) wood ash (trace) asphalt* (heavy amount)
Area 4, well MW-2	15-17'	tar derivatives (light to moderate amount)
4W-1	16-18'	anthracite coal (light amount) asphalt* (light to moderate amount)

NOTES:

1. Samples analyzed by STL laboratory using PLM/EDX microscopy techniques.
2. Sample MW 2 collected by Tighe & Bond; other samples collected by OTO.
- *. STL has indicated that coal tar may be misidentified as asphalt based on the presence of embedded minerals.

Table 13
Summary of QA/QC Samples Collected
Historic Mill River; Northampton, MA

	Soil	Groundwater
Number of samples (not including blanks or duplicates)	38	19
Number of Trip Blanks	3	2
Number of Equipment Blanks	---	1 - pump & tubing 1 - filter sand
Number of Field Duplicates (to same laboratory)	2	1
Number of Field Duplicates (to different laboratory)	---	10
Totals:	43	34

Table 14
Field Duplicate Samples: Relative Percent Differences (RPDs)
Historic Mill River, Northampton, MA

GROUNDWATER

Concentrations in ug/liter		depth (ft)	
Monitoring Well:	3W-1	3W-ID	
Date Collected:	9/30/03	9/30/03	RPD
VOCs			
Benzene	110	110	0
Ethylbenzene	150	150	0
Toluene	3	2.6	14
Naphthalene	1100	890	21
Xylenes (total)	35	36	3
VPH			
C5-C8 Aliphatics	< 100	< 100	0
C9-C12 Aliphatics	< 25	< 25	0
C9-C10 Aromatics	680	680	0
EPH			
C9-C18 Aliphatics	< 110	< 110	0
C19-C36 Aliphatics	< 110	< 110	0
C11-C22 Aromatics	2500	2000	15
Cyanide	31	40	-25
Total Metals (PP-13&Ba)			
Arsenic	< 5	< 5	0
Barium	< 200	< 200	0
Chromium	< 10	< 10	0
Copper	< 25	< 25	0
Lead	8.2	< 5	-2Q1
Mercury	< 0.2	< 0.2	0
Nickel	< 40	< 40	0
Zinc	< 20	< 20	0

SOIL

Concentrations in mg/kg		depth (in)	
Sample No.:	3W-1, 16-18'	3W-ID	
Date Collected:	9/18/03	9/18/03	RPD
EPH			
C9-C18 Aliphatics	< 59	< 59	0
C19-C36 Aliphatics	< 59	61	+2Q1
C11-C22 Aromatics	< 59	140	+2Q1
SVOCs			
Acenaphthene	92%	92%	-116
Acenaphthylene	0.56	2.1	0
Anthracene	< 0.3	< 0.29	0
Benzo(a)anthracene	2	6.4	-105
Benzo(a)pyrene	4.1	7.5	-59
Benzo(b)fluoranthene	3.5	6.3	-57
Benzo(g,h,i)fluoranthene	4.5	8	-56
Benzo(k)fluoranthene	2	3.5	-55
Benzo(a)fluoranthene	1.7	2.6	-42
Carbazole	0.54	1.4	-89
Chrysene	3.7	6.6	-56
Dibenz(a,h)anthracene	0.56	0.97	-54
Dibenzofuran	0.51	2.1	-122
2,4-Dimethylphenol	< 0.3	< 0.29	0
Fluoranthene	10	18	-57
Fluorene	0.84	2.9	-110
Indeno(1,2,3-cd)pyrene	2.3	3.9	-52
2-Methylbiphenyl	< 0.3	0.81	-92
4-Methylphenol	< 0.3	< 0.29	0
Naphthalene	0.4	0.77	-63
Phenanthrene	8.3	20	-83
Pyrene	8.4	16	-62
Cyanide (total)			
	< 1.1	< 1	0
Metals (PP-13 + Ba)			
Arsenic	< 5.5	< 5.7	0
Barium	< 6.9	< 7.1	0
Beryllium	64	70	-9
Cadmium	< 0.69	< 7.1	0
Chromium	< 0.69	< 7.1	0
Copper	20	19	5
Lead	31	22	34
Mercury	44	39	12
Nickel	< 0.59	0.2	>109
Selenium	17	15	13
Silver	< 11	< 11	0
Thallium	< 1.9	< 2	0
Zinc	< 0.69	< 7.1	0
	51	49	4

SOIL

Concentrations in mg/kg		depth (in)	
Sample No.:	4H5	4H5D	
Date Collected:	6/10/03	6/10/03	RPD
EPH			
C9-C18 Aliphatics	< 72	< 74	0
C19-C36 Aliphatics	160	120	29
C11-C22 Aromatics	360	350	3
PCBs			
Aroclor 1260	0.13	0.15	-14
Cyanide (total)			
	< 1.4	< 1.3	0
Metals (total PP13+Ba)			
Arsenic	< 6.7	< 6.8	0
Barium	10	10	0
Beryllium	87	88	1
Cadmium	< 0.83	< 0.85	0
Chromium	< 0.83	0.89	-2Q1
Copper	27	27	0
Lead	59	61	-3
Mercury	260	310	18
Nickel	0.29	0.20	37
Selenium	21	20	5
Silver	< 1.3	< 1.4	0
Thallium	< 2.3	< 2.4	0
Zinc	< 8.3	< 8.5	0
	170	200	16

NOTES:

1. Duplicate results are considered acceptable if RPD is < 50% or results are within twice the quantitation limit (2Q1).
2. Values in bold exceed acceptance criteria.

Table 14 (continued)
Field Duplicate Samples: Relative Percent Differences (RPDs)
Historic Mill River, Northampton, MA

INTERLABORATORY DUPLICATES
GROUNDWATER

Concentrations in ug/liter

Monitoring Well:	2W-9	2W-16	3W-2	4W-1	4W-5	4W-6
Date Collected:	10/21/03	9/30/03	10/21/03	10/21/03	10/21/03	10/21/03
Collection Method:	low flow	low flow	low flow	low flow	low flow	low flow
Lead (unfiltered; AMRO)	32]	< 5]	32	8]	< 5	< 5
Lead (unfiltered; Spectrum)	18]	< 7.5	22	57	< 7.5	< 7.5
RPD:	56	0	37	35	0	0
Lead (1.6 µm filtered; AMRO)	--	< 5	--	--	--	--
Lead (1.6 µm filtered; Spectrum)	--	< 7.5	--	--	--	--
RPD:	--	0	--	--	--	--
Lead (0.45 µm filtered; AMRO)	--	< 5	--	--	--	--
Lead (0.45 µm filtered; Spectrum)	--	< 7.5	--	--	--	--
RPD:	--	0	--	--	--	--
Mercury (unfiltered; AMRO)	< 0.2	< 0.20	--	--	--	--
Mercury (unfiltered; Spectrum)	< 0.4	< 0.40	--	--	--	--
RPD:	0	0	--	--	--	--
Mercury (0.45 µm filtered; AMRO)	--	< 0.20	--	--	--	--
Mercury (0.45 µm filtered; Spectrum)	--	< 0.40	--	--	--	--
RPD:	--	0	--	--	--	--

NOTES:

1. Duplicate results are considered acceptable if RPD is < 50% or results are within twice the quantitation limit (+2QL).
2. Values in bold exceed acceptance criteria.

Table 15
Premium Soil Disposal Cost Estimates
Historic Mill River, Northampton, MA

Site Area	Medium	Approximate Soil Amount (tons)	Likely Disposal Option	Cost Estimate for Trucking and Disposal
Area 1	PAH impacted soil	4,000	Landfill/daily cover	\$120,000 to \$200,000
Area 2	PAH impacted soil	19,000	Landfill/daily cover	\$570,000 to \$950,000
Area 3	PAH impacted soil	13,000	Landfill/daily cover	\$390,000 to \$650,000
	coal tar impacted soil	10,000	Thermal desorption	\$500,000 to \$1,000,000
Area 4	PAH impacted soil	9,000	Landfill/daily cover	\$270,000 to \$450,000
Totals:		55,000		\$1,850,000 to \$3,250,000

NOTES:

1. Cost estimates are not based on final streambed design and should not be interpreted as fixed estimates or quotes.

APPENDIX A LIMITATIONS

LIMITATIONS

1. The observations presented in this report were made under the conditions described herein. The conclusions presented in this report were based solely upon the services described in the report and not on scientific tasks or procedures beyond the scope of the project or the time and budgetary constraints imposed by the client.
2. In preparing the report, O'Reilly, Talbot, Okun & Associates, Inc. relied on certain information provided by state and local officials and other parties referenced herein, and on information contained in the files of state or local regulatory agencies. Although there may have been some degree of overlap in the information provided by these sources, O'Reilly, Talbot, Okun & Associates, Inc. did not attempt to independently verify the accuracy or completeness of all information reviewed or received during the course of this assessment.
3. Observations were made of the site and of the structures on the Site as indicated within the report. Where access to portions of the site or to structures on the site was unavailable or limited, we render no opinion as to the presence or hazardous materials or oil, or to the presence of indirect information relating to hazardous materials or oil in that portion of the site. In addition, we render no opinion as to the presence of hazardous materials or oil, where direct observations of portions of the Site were obstructed by objects or coverings on or over these surfaces.
4. Unless otherwise specified in the Report, we did not perform testing or analyses to determine the presence or concentration or concentration of asbestos or polychlorinated biphenyls (PCBs) at the Site or in the environment at the Site.
5. The purpose of this Report was to assess the physical characteristics of the subject site with respect to the presence of oil and/or hazardous material (OHM) in soil or groundwater at the Site, and to assess risks associated with detected OHM, within the meaning of the Massachusetts Contingency Plan (MCP), 310 CMR 40.0000. No specific attempt was made to check on the compliance of present or past owners or operators of the Site with federal, state, or local laws and regulations, environmental or otherwise.
6. Risk assessment was performed in accordance with generally accepted practices of government agencies and other consultants conducting similar characterizations. The findings of the risk characterization are dependent on numerous assumptions and uncertainties inherent in the risk assessment process. Therefore, the findings of the risk assessment should not be interpreted as an absolute characterization of actual risks, but as general indicators highlighting potential sources of risk at the site. Although the range of uncertainty in the risk characterization has not (and cannot) be quantified, the use of conservative assumptions throughout the process would be expected to err on the side of protection of human health and the environment.
7. Cost estimates may have been developed for remedial actions considered potentially applicable at the Site. These estimates are preliminary and were developed for the purpose of comparing alternative response actions. They are based upon published information, discussions with remediation contractors and our experience at other sites. Actual cost will vary.

LIMITATIONS

8. Our report was prepared for the exclusive benefit of City of Northampton. The report and its conclusions is not extended to third parties or future property owners. We acknowledge copies of our report may be submitted to Massachusetts Department of Environmental Protection (MADEP) for MCP compliance purposes.

APPENDIX B
PHOTOGRAPHS OF STUDY AREAS



Area 1, facing north: Wetlands and Felt Building



Border of parcels 1 and 2, facing west:
Veteran's field and woodlands



Area 2, facing south: Veteran's field



Area 2, facing west:
Footpath; overgrown river channel on left



Area 3, facing north: Parking lot and Roundhouse



Streambed east of Old South Street parking lot



Area 4, facing south:
Pleasant Street on right; Mill River in tree line (not visible)



Area 4, facing east: Existing Mill River flow

APPENDIX C
INFORMATION FROM REPORTS BY OTHERS

EPA CONTRACT NO. 68_W6_0042
EPA WORK ASSIGNMENT NO. 106-SIBZ-01ZZ

EPA Project Officer: Diana King
EPA Work Assignment Manager: Jim Byrne

TARGETED BROWNFIELDS ASSESSMENT

ROUNDHOUSE PARKING LOT NORTHAMPTON, MASSACHUSETTS

January 2002

Prepared By:

*Metcalf & Eddy
30 Harvard Mill Square
Wakefield, Massachusetts*



Table 4-1. Summary Of Analytical Data -- Soil *
TBA Investigation -- Roundhouse Parking Lot -- May/June 2001

LOCATION NAME SAMPLE DEPTH (ft bgs) M&E SAMPLE ID DATE SAMPLED	TB-1 16 - 17 ME-2 5/29/01	TB-2 12 - 14 ME-3 5/29/01	TB-3 18 - 20 ME-1 5/29/01	TB-4 10 - 12 ME-4 5/30/01	TB-5 12 - 13 ME-5 5/30/01	TB-6 6 - 7 ME-6 5/30/01	MCP Reportable Concentrations **
COMMENTS							RCS-1
PARAMETER/ANALYTE							
VOLATILE PETROLEUM HYDROCARBONS - MADEP-VPH-98-1 (µg/kg)							
C ₅ -C ₈ Aliphatics (I)	8,300 UJ	2,300 UJ	3,000 UJ	2,000 UJ	49,000 J	9,800 UJ	100,000
C ₉ -C ₁₂ Aliphatics (I)	30,000 J	460 UJ	610 UJ	790 J	29,000 J	2,000 UJ	1,000,000
C ₉ -C ₁₀ Aromatics (I)	39,000 J	770 J	910 UJ	2,200 J	460,000 J	2,900 UJ	100,000
Benzene	410 UJ	110 UJ	150 UJ	100 UJ	130,000 J	490 UJ	10,000
Toluene	1,200 UJ	340 UJ	450 UJ	300 UJ	67,000 J	1,500 UJ	90,000
Ethylbenzene	410 UJ	110 UJ	150 UJ	100 UJ	3,200 J	490 UJ	80,000
m/p-Xylene	1,700 UJ	460 UJ	610 UJ	400 UJ	41,000 J	2,000 UJ	500,000
o-Xylene	830 UJ	230 UJ	300 UJ	200 UJ	13,000 J	980 UJ	500,000
Naphthalene	1,700 J	260 J	300 UJ	1,100 J	3,800,000 J	8,400 J	4,000
EXTRACTABLE PETROLEUM HYDROCARBONS - MADEP-EPH-98-1 (µg/kg)							
C ₉ -C ₁₈ Aliphatics (I)	6,700	3,600 U	4,400 U	3,600 U	2,200,000 J	32,000 J	1,000,000
C ₁₉ -C ₂₆ Aliphatics (I)	5,600 U	20,000	5,900 U	46,000	140,000 J	400,000 J	2,500,000
C ₁₁ -C ₂₂ Aromatics (I)	12,000 U	190,000	12,000 U	220,000	19,000,000	370,000	200,000
Acenaphthene	700 U	860	740 U	630	330,000	1,800	20,000
Acenaphthylene	700 U	1,100	740 U	1,100	700,000	1,600	100,000
Anthracene	700 U	2,400	740 U	1,400	970,000	6,400	1,000,000
Benzo(a)anthracene	700 U	4,400	740 U	4,700	610,000	11,000	700
Benzo(a)pyrene	700 U	5,100	740 U	6,300	440,000	11,000	700
Benzo(b)fluoranthene	700 U	6,300	740 U	7,600	480,000	13,000	700
Benzo(g,h,i)perylene	700 U	2,900	740 U	5,000	59,000 U	4,300	1,000,000
Benzo(k)fluoranthene	700 U	2,300	740 U	600 U	59,000 U	4,900	7,000
Chrysene	700 U	4,600	740 U	600 U	490,000	11,000	7,000
Dibenz(a,h)anthracene	700 U	870	740 U	950	59,000 U	1,700	700
Fluoranthene	700 U	12,000	740 U	9,500	2,000,000	28,000	1,000,000
Indeno(1,2,3-cd)pyrene	700 U	1,800	740 U	1,000	1,200,000	6,200	400,000
Naphthalene	700 U	3,100	740 U	3,800	59,000 U	5,300	700
Phenanthrene	700 U	600 U	740 UJ	1,500 J	3,900,000	3,500	4,000
Pyrene	700 U	8,600	740 U	5,400	3,200,000	26,000	100,000
2-Methylnaphthalene	700 U	9,700	740 U	8,300	1,900,000	21,000	700,000
		600 U	740 U	740	1,100,000	1,700	4,000

Table 4-1. Summary Of Analytical Data -- Soil *
TBA Investigation -- Roundhouse Parking Lot -- May/June 2001

LOCATION NAME SAMPLE DEPTH (ft bgs) M&E SAMPLE ID DATE SAMPLED COMMENTS	TB-1 16 - 17 ME-2 5/29/01	TB-2 12 - 14 ME-3 5/29/01	TB-3 18 - 20 ME-1 5/29/01	TB-4 10 - 12 ME-4 5/30/01	TB-5 12 - 13 ME-5 5/30/01	TB-6 6 - 7 ME-6 5/30/01	MCP Reportable Concentrations ** RCS-1
INORGANICS - RAS (mg/kg)							
Aluminum	29,300	4,620	31,600	NA	NA	6,330	--
Antimony	1.4 J	1.3 J	1.5 U	NA	NA	1.0 U	10
Arsenic	5.9	1.1 J	7.0	NA	NA	0.90 J	30
Barium	324	50.2	317	NA	NA	51.3	1,000
Calcium	3,060	1,720	4,030	NA	NA	2,400	--
Chromium	54.2	15.0	55.8	NA	NA	18.3	1,000
Cobalt	28.9	4.5	30.5	NA	NA	4.8	500
Copper	57.7	32.8	66.4	NA	NA	13.6	1,000
Cyanide	0.29 UJ	0.24 UJ	0.32 UJ	0.24 UJ	NA	0.22 UJ	100
Iron	50,800	8,870	53,900	NA	NA	8,870	--
Lead	24.7	300	21.0	NA	NA	26.0	300
Magnesium	13,300	2,180	16,500	NA	NA	2,700	--
Manganese	650	104	1,060	NA	NA	224	--
Mercury	0.07 U	0.12	0.08 U	NA	NA	0.07	20
Nickel	55.2	12.5	61.5	NA	NA	13.8	300
Potassium	8,560 J	669 J	10,500 J	NA	NA	877 J	--
Selenium	2.3 J	1.0 UJ	1.4 UJ	NA	NA	0.91 UJ	400
Sodium	492 J	152	503 J	NA	NA	179	--
Thallium	1.6 J	1.3 UJ	1.7 UJ	NA	NA	1.2 UJ	8
Vanadium	71.3	19.6	76.1	NA	NA	19.1	400
Zinc	164	128	159	NA	NA	46.1	2,500
LAB SAMPLE ID							
Volatile Petroleum Hydrocarbons	81142002	81142003	81142001	81142004	81159001	81159002	
Extractable Petroleum Hydrocarbons	81142002	81142003	81142001	81142004	81159001	81159002	
Inorganics (Metals/Cyanide)	MA02B1	MA02B2	MA02B0	MA02B3		MA02B5	

Table 4-1. Summary Of Analytical Data -- Soil *
TBA Investigation -- Roundhouse Parking Lot -- May/June 2001

LOCATION NAME SAMPLE DEPTH (ft bgs) M&E SAMPLE ID DATE SAMPLED COMMENTS	TB-1 16 - 17 ME-2 5/29/01	TB-2 12 - 14 ME-3 5/29/01	TB-3 18 - 20 ME-1 5/29/01	TB-4 10 - 12 ME-4 5/30/01	TB-5 12 - 13 ME-5 5/30/01	TB-6 6 - 7 ME-6 5/30/01	MCP Reportable Concentrations ** RCS-1
INORGANICS - RAS (mg/kg)							
Aluminum	29,300	4,620	31,600	NA	NA	6,330	--
Antimony	1.4 J	1.3 J	1.5 U	NA	NA	1.0 U	10
Arsenic	5.9	1.1 J	7.0	NA	NA	0.90 J	30
Barium	324	50.2	317	NA	NA	51.3	1,000
Calcium	3,060	1,720	4,030	NA	NA	2,400	--
Chromium	54.2	15.0	55.8	NA	NA	18.3	1,000
Cobalt	28.9	4.5	30.5	NA	NA	4.8	500
Copper	57.7	32.8	66.4	NA	NA	13.6	1,000
Cyanide	0.29 UJ	0.24 UJ	0.32 UJ	0.24 UJ	NA	0.22 UJ	100
Iron	50,800	8,870	53,900	NA	NA	8,870	--
Lead	24.7	300	21.0	NA	NA	26.0	300
Magnesium	13,300	2,180	16,500	NA	NA	2,700	--
Manganese	650	104	1,060	NA	NA	224	--
Mercury	0.07 U	0.12	0.08 U	NA	NA	0.07	20
Nickel	55.2	12.5	61.5	NA	NA	13.8	300
Potassium	8,560 J	669 J	10,500 J	NA	NA	877 J	--
Selenium	2.3 J	1.0 UJ	1.4 UJ	NA	NA	0.91 UJ	400
Sodium	492 J	152	503 J	NA	NA	179	--
Thallium	1.6 J	1.3 UJ	1.7 UJ	NA	NA	1.2 UJ	8
Vanadium	71.3	19.6	76.1	NA	NA	19.1	400
Zinc	164	128	159	NA	NA	46.1	2,500
LAB SAMPLE ID							
Volatile Petroleum Hydrocarbons	81142002	81142003	81142001	81142004	81159001	81159002	
Extractable Petroleum Hydrocarbons	81142002	81142003	81142001	81142004	81159001	81159002	
Inorganics (Metals/Cyanide)	MA02B1	MA02B2	MA02B0	MA02B3		MA02B5	

Table 4-1. Summary Of Analytical Data -- Soil *
TBA Investigation -- Roundhouse Parking Lot -- May/June 2001

LOCATION NAME SAMPLE DEPTH (ft bgs) M&E SAMPLE ID DATE SAMPLED COMMENTS	TB-7 15 - 17 ME-7 5/31/01	TB-8			TB-9		MCP Reportable Concentrations RCS-I
		5 - 7	16 - 17		10 - 12		
		ME-8 5/31/01	ME-10 (2) 5/31/01	KME-10 (2) 5/31/01 FD	ME-9 5/31/01	KME-11 5/31/01 FD	
INORGANICS - RAS (mg/kg)							
Aluminum	8,490	10,400	3,050	NA	5,260	5,910	—
Antimony	1.0 U	1.3 J	1.1 U	NA	1.1 U	1.1 U	10
Arsenic	0.78 J	3.5	0.78 U	NA	0.87 J	0.77 U	30
Barium	37.2	80.8	17.0	NA	39.8	42.3	1,000
Calcium	1,300	15,400	931	NA	1,200	1,300	—
Chromium	16.7	17.8	7.2	NA	12.0	13.9	1,000
Cobalt	6.3	9.0	2.6	NA	4.7	5.4	500
Copper	14.3	22.2	6.3	NA	10.2	11.9	1,000
Cyanide	0.21 UJ	0.24 UJ	0.56 J	NA	0.22 UJ	0.22 UJ	100
Iron	12,400	15,900	5,280	NA	8,980	10,400	—
Lead	7.1	54.9	4.4	NA	8.4	10.3	300
Magnesium	3,140	3,950	1,180	NA	2,060	2,360	—
Manganese	214	351	64.0	NA	209	229	—
Mercury	0.05 U	0.06 U	0.06 U	NA	0.05 U	0.06 U	20
Nickel	13.6	17.8	6.8	NA	9.3	10.6	300
Potassium	1,390 J	2,130 J	505 J	NA	882 J	955 J	—
Selenium	0.92 UJ	1.0 UJ	0.97 UJ	NA	0.95 UJ	0.96 UJ	400
Sodium	251	277	115	NA	93.5	118	—
Thallium	1.2 UJ	1.3 UJ	1.2 UJ	NA	1.2 UJ	1.2 UJ	8
Vanadium	20.2	26.8	7.8	NA	14.2	15.7	400
Zinc	37.0	52.1	20.3	NA	23.1	27.6	2,500
LAB SAMPLE ID							
Volatile Petroleum Hydrocarbons	81159003	81159004	81159005	81159006	81159007	MA02C0	
Extractable Petroleum Hydrocarbons	81159003	81159004	81159005	81159006	81159007		
Inorganics (Metals/Cyanide)	MA02B6	MA02B7	MA02B9		MA02B8		

TABLE 4-1 NOTES:

1. Hydrocarbon ranges are adjusted to exclude the concentration of target and QC (surrogate) analytes.
2. Refer to Section 3.3 of the TBA report for an explanation of the field duplicate results

* - Validated data is presented. Analyte presented if it was detected in at least one sample from this grouping.

** - Values shown for standards are in the same units as the analytical data.

MADEP Criteria

MCP Reportable Concentrations, 310 CMR 40.0000 Subpart P Massachusetts Oil and Hazardous Material List

"--" indicates no MCP Reportable Concentration available

ft bgs - feet below ground surface

FD - Field Duplicate

J - Quantitation is approximate due to limitations identified in the quality control review.

NA - Not analyzed.

U - Value reported is the sample-specific detection limit.

Bold - indicates value greater than applicable MCP reportable concentration

Table 4-2. Summary Of Analytical Data -- Groundwater *
TBA Investigation -- Roundhouse Parking Lot -- May/June 2001

LOCATION NAME SAMPLE DEPTH (ft bgs) ** M&E SAMPLE ID DATE SAMPLED COMMENTS	MW/TB-2	MW/TB-4		MW/TB-6	MW/TB-7	MW/TB-8	MCP Reportable Concentrations *** RCGW-2
	15 - 25	10 - 20		10 - 20	15 - 25	12 - 22	
	ME-3 6/5/01	ME-4 6/5/01	KME-4 6/5/01 FD	ME-6 6/6/01	ME-7 6/6/01	ME-8 6/5/01	
PARAMETER/ANALYTE							
<u>VOLATILE PETROLEUM HYDROCARBONS - MADEP-VPH-98-1 (ug/l)</u>							
C ₅ -C ₈ Aliphatics (1)	100 U	100 U	100 U	350	100 U	910	1,000
C ₉ -C ₁₂ Aliphatics (1)	20 U	24	28	1,200	840	140	1,000
C ₉ -C ₁₀ Aromatics (1)	30 U	39	37	7,400	3,900	5,100	4,000
Benzene	5 U	5 U	5 U	670	190	1,000	2,000
Toluene	15 U	15 U	15 U	190	15 U	800	6,000
Ethylbenzene	5 U	5 U	5 U	1,600	600	130	4,000
m/p-Xylene	20 U	20 U	20 U	420	400	360	6,000
o-Xylene	10 U	10 U	10 U	520	290	160	6,000
Naphthalene	10 U	30	33	6,200	2,900	3,600	6,000
<u>EXTRACTABLE PETROLEUM HYDROCARBONS - MADEP-EPH-98-1 (ug/l)</u>							
C ₉ -C ₁₈ Aliphatics (1)	30 UJ	30 UJ	30 UJ	810 J	370 J	460 J	1,000
C ₁₉ -C ₃₆ Aliphatics (1)	40 U	160 J	40 UJ	40 U	40 U	40 U	20,000
C ₁₁ -C ₂₂ Aromatics (1)	85 U	85 U	85 U	3,100	550	85 U	30,000
Acenaphthene	5 U	5 U	5 U	250	62	5 U	5,000
Acenaphthylene	5 U	5 U	5 U	35	5 U	5 U	3,000
Anthracene	5 U	5 U	5 U	32	7	5 U	600
Benzo(a)anthracene	5 U	5 U	5 U	20	5 U	5 U	3,000
Benzo(b)fluoranthene	5 U	5 U	5 U	8	5 U	5 U	3,000
Fluoranthene	5 U	5 U	5 U	57	5 U	5 U	200
Fluorene	5 U	5 U	5 U	73	22	5 U	3,000
Naphthalene	6	19	22	2,200	740	19	60,000
Phenanthrene	5 U	5	5	120	34	5	50
Pyrene	5 U	5 U	5 U	52	5 U	5 U	3,000
2-Methylnaphthalene	5 U	5 U	5 U	520	190	5 U	3,000

Table 4-2. Summary Of Analytical Data -- Groundwater *
TBA Investigation -- Roundhouse Parking Lot -- May/June 2001

LOCATION NAME SAMPLE DEPTH (ft bgs) ** M&E SAMPLE ID DATE SAMPLED COMMENTS	MW/TB-2	MW/TB-4		MW/TB-6	MW/TB-7	MW/TB-8	MCP Reportable Concentrations *** RCGW-2
	15 - 25	10 - 20		10 - 20	15 - 25	12 - 22	
	ME-3 6/5/01	ME-4 6/5/01	KME-4 6/5/01 FD	ME-6 6/6/01	ME-7 6/6/01	ME-8 6/5/01	
PARAMETER/ANALYTE							
<u>VOLATILE PETROLEUM HYDROCARBONS - MADEP-VPH-98-1 (ug/l)</u>							
C ₅ -C ₈ Aliphatics (1)	100 U	100 U	100 U	350	100 U	910	1,000
C ₉ -C ₁₂ Aliphatics (1)	20 U	24	28	1,200	840	140	1,000
C ₉ -C ₁₀ Aromatics (1)	30 U	39	37	7,400	3,900	5,100	4,000
Benzene	5 U	5 U	5 U	670	190	1,000	2,000
Toluene	15 U	15 U	15 U	190	15 U	800	6,000
Ethylbenzene	5 U	5 U	5 U	1,600	600	130	4,000
m/p-Xylene	20 U	20 U	20 U	420	400	360	6,000
o-Xylene	10 U	10 U	10 U	520	290	160	6,000
Naphthalene	10 U	30	33	6,200	2,900	3,600	6,000
<u>EXTRACTABLE PETROLEUM HYDROCARBONS - MADEP-EPH-98-1 (ug/l)</u>							
C ₉ -C ₁₈ Aliphatics (1)	30 UJ	30 UJ	30 UJ	810 J	370 J	460 J	1,000
C ₁₉ -C ₃₆ Aliphatics (1)	40 U	160 J	40 UJ	40 U	40 U	40 U	20,000
C ₁₁ -C ₂₂ Aromatics (1)	85 U	85 U	85 U	3,100	550	85 U	30,000
Acenaphthene	5 U	5 U	5 U	250	62	5 U	5,000
Acenaphthylene	5 U	5 U	5 U	35	5 U	5 U	3,000
Anthracene	5 U	5 U	5 U	32	7	5 U	600
Benzo(a)anthracene	5 U	5 U	5 U	20	5 U	5 U	3,000
Benzo(b)fluoranthene	5 U	5 U	5 U	8	5 U	5 U	3,000
Fluoranthene	5 U	5 U	5 U	57	5 U	5 U	200
Fluorene	5 U	5 U	5 U	73	22	5 U	3,000
Naphthalene	6	19	22	2,200	740	19	60,000
Phenanthrene	5 U	5	5	120	34	5	50
Pyrene	5 U	5 U	5 U	52	5 U	5 U	3,000
2-Methylnaphthalene	5 U	5 U	5 U	520	190	5 U	3,000

TABLE 4-2 NOTES:

1. Hydrocarbon ranges are adjusted to exclude the concentration of target and QC (surrogate) analytes.

* - Validated data is presented. Analyte presented if it was detected in at least one sample from this grouping.

** - Screened interval depth.

*** - Values shown for standards are in the same units as the analytical data.

MADEP Criteria

MCP Reportable Concentrations, 310 CMR 40.0000 Subpart P Massachusetts Oil and Hazardous Material List

"--" indicates no MCP Reportable Concentration available

ft bgs - feet below ground surface

FD - Field Duplicate

J - Quantitation is approximate due to limitations identified in the quality control review.

R - Value is rejected.

U - Value reported is the sample-specific detection limit.

Bold - indicates value greater than applicable MCP reportable concentration

Wheeler & Deane Associates, Inc.

**Intersection of East Street and
Rockingham Road
Northampton, Massachusetts**

Prepared for:

**City of Northampton
Northampton, Massachusetts**

June 2002

Revised: September 2002

Prepared by:

Tighe & Bond



STL Billerica

149 Rangeway Road
North Billerica, MA 01862

Tel: 978 667 1400
Fax: 978 667 7871
www.stl-inc.com

Tighe & Bond, Inc.
53 Southampton Road
Westfield, MA 01085

Attention: Melissa Parsons
STL Job #: 31419
Billing Ref.: Proj# N-484-1-72 (1160)

August 21, 2002

Dear Melissa:

Please find enclosed one (1) PLM photomicrograph, one (1) SEM photomicrograph and one (1) EDX spectrum of the black material detected in the sample that you submitted for coal/coke flyash identification by SEM/EDX and PLM.

METHODS:

A portion of each sample was dried in a drying oven to remove any moisture and examined under a stereo microscope. A number of black grains, consistent in appearance to coal or coal flyash, were picked out of the dried soil sample. A portion of these black grains were ground into a powder with a mortar and pestle and mounted in index of refraction liquid ($n=1.605$) on a glass slide for the Polarized Light Microscope (PLM) examination. Another portion of these black grains were mounted on double-sided tape and coated with evaporated graphite which improves image quality. This sample was then examined under a Scanning Electron Microscope (SEM). An Energy Dispersive X-Ray (EDX) analysis was conducted during the SEM examination of these grains to determine their elemental composition. Photomicrographs were taken of the sample both by PLM and by SEM to document the morphology of the grains.

**SEVERN
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SERVICES**

STL Billerica

FINDINGS:

MW-2

Please refer to the PLM and SEM photomicrographs as well as the EDX spectrum.

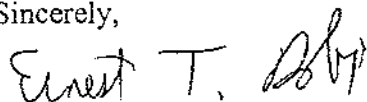
This sample contained one type of black grain. The particles appear as irregularly shaped opaque grains under the PLM (photo #1) which are partially dissolving as a yellow to orange-brown color in the refractive index oil. The texture of the black grains was extremely soft and jelly-like. The SEM photomicrograph (#0000) shows both a smooth and globular surface. The EDX spectrum exhibits a very strong concentration of sulfur and a trace of silicon. These characteristics and elemental ratios are consistent with various tar derivatives.

DISCUSSION:

The EDX data, texture and morphology of the grains as seen by the PLM and SEM were consistent for the presence of a light to moderate concentration of tar derivatives in sample MW-2. No coal, coal ash or wood ash was detected.

Should you have further questions, or need additional information, please do not hesitate to contact me or client services at any time.

Sincerely,



Ernest T. Dobi, Ph.D
Manager, Microscopy Services

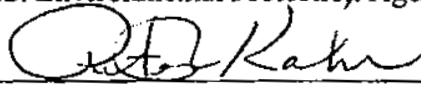
TARGETED BROWNFIELDS ASSESSMENT SOIL GAS SURVEY REPORT

ROUNDHOUSE PARKING LOT NORTHAMPTON, MA

DECEMBER 2001

Prepared for: James Byrne, Office of Site Remediation & Restoration, Brownfields Project Manager,
U.S. Environmental Protection Agency, New England

Prepared by:



Date: 12/28/01

Peter R. Kahn, ECA Air Monitoring Team Engineer

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND REGIONAL LABORATORY
OFFICE OF ENVIRONMENTAL MEASUREMENT & EVALUATION
11 TECHNOLOGY DRIVE
NORTH CHELMSFORD, MA 01863**

TABLE 7
ROUNDHOUSE PARKING LOT
SOIL GAS CANISTER
SUMMARY DATA 12/5/01

TARGET COMPOUND	RH #1 ppb/v	RH #5 ppb/v	MB #1 ppb/v	MB #4 ppb/v	PH #2 ppb/v	IS #2 ppb/v	NS #1 ppb/v
Benzene	14	4.2	ND (0.79)	ND (0.83)	ND (0.16)	ND (0.88)	ND (0.15)
Toluene	25	4.2	0.20 L	0.53 L	0.07 L	0.75 L	0.17
Ethylbenzene	5.3	1.9	ND (0.79)	ND (0.83)	ND (0.16)	ND (0.88)	ND (0.15)
m,p-Xylene	68	7.5	ND (1.5)	0.46 L	ND (0.31)	0.51 L	ND (0.30)
o-Xylene	42	5.1	ND (0.79)	0.47 L	ND (0.16)	ND (0.88)	ND (0.15)
Tetrachloroethylene	0.15 L	0.72	2.7	ND (0.81)	ND (0.15)	ND (0.86)	0.37
1,1,1-Trichloroethane	0.12 L	0.15 L	0.15 L	ND (0.81)	ND (0.15)	0.13 L	ND (0.15)
1,2,4-Trimethylbenzene	72	5.6	0.33 L	1.1	ND (0.16)	ND (0.88)	ND (0.15)
1,3,5-Trimethylbenzene	37	2.5	ND (0.79)	0.50 L	ND (0.16)	ND (0.88)	ND (0.15)
4-Ethyltoluene	25	2	ND (0.85)	0.29 L	ND (0.17)	ND (0.95)	ND (0.17)
Acetone	3.1 J	2.5 J	ND (0.75)	ND (0.79)	ND (0.15)	ND (0.84)	ND (0.15)
Carbon Disulfide	0.54 L	0.12 L	ND (0.77)	ND (0.81)	0.05 L	0.24 L	ND (0.15)
Dichlorodifluoromethane (F12)	0.51 L	0.56	0.53 L	0.73 L	0.98	54	0.40 J
Ethyl/Vinyl Acetate	ND (1.6)	1.7	ND (1.6)	ND (1.7)	0.12 L	ND (1.8)	ND (0.32)
Methylene Chloride	0.41 L	0.15 L	0.41 L	0.46 L	0.08 L	0.46 L	ND (0.31)
Styrene	50	2.4	0.49 L	3.7	ND (0.15)	ND (0.84)	ND (0.15)
Trichlorofluoromethane (F11)	1.1	0.37	0.20 L	0.27 L	0.28	0.26 L	0.28
Trichlorotrifluoroethane	ND (0.77)	0.10 L	ND (0.79)	0.07 L	0.09 L	ND (0.88)	0.09 L

TENTATIVELY IDENTIFIED COMPOUND	RH #1 ppb/v	RH #5 ppb/v	MB #1 ppb/v	MB #4 ppb/v	PH #2 ppb/v	IS #2 ppb/v	NS #1 ppb/v
Naphthalene	ND	34 J	150 J	100 J	ND	ND	ND
1-Methylnaphthalene	ND	ND	17 J	ND	ND	ND	ND
1,4-Dihydro-1,4-Methanonaphthalene	ND	5 J	ND	ND	ND	ND	ND
1,2,3-Trimethylbenzene	56 J	4.4 J	ND	ND	ND	ND	ND
1-Propenylbenzene	ND	10 J	ND	ND	ND	ND	ND
2-Propenylbenzene	58 J	ND	ND	ND	ND	ND	ND
2-Ethenyl-1,4-Dimethylbenzene	25 J	ND	ND	ND	ND	ND	ND
1,2,4,5-Tetramethylbenzene	35 J	ND	ND	ND	ND	ND	ND
Methyl(1-Methylethenyl) Benzene	22 J	ND	ND	ND	ND	ND	ND
Indane	44 J	ND	ND	ND	ND	ND	ND
Indene	94 J	ND	ND	ND	ND	ND	ND
1-Methylene-1H-Indene	280 J	ND	ND	ND	ND	ND	ND
1-Ethylidene-1H-Indene	ND	4.2 J	ND	ND	ND	ND	ND
3-Phenyl-1,2-Butadiene	40 J	ND	ND	ND	ND	ND	ND
Bicyclo[4.4.1] Undeca 1,3,5,7,9-Pentane	ND	ND	ND	15 J	ND	ND	ND

NOTES:

Only those compounds detected above their reporting limits are presented on the table.

J = Estimated Value

L = Estimated value, below the calibration range

ND = not detected above RL, RL shown in parentheses

RH = Roundhouse Building

MB = Municipal Building

PH = Joseph H. McDonald House Public Housing

IS = Parking Lot Island West of the Roundhouse Plaza

NS = New South Street Apartment Building

CITY OF NORTHAMPTON
CITY HALL

UNITARIAN
CHURCH

MEMORIAL HALL

STONE & CONCRETE
RETAINING WALL

3 STORY BRICK OFFICE
MUNICIPAL BUILDING

ACADEMY OF MUSIC
&
PULASKI PARK

2 STORY BRICK
BUILDING (ROUNDHOUSE)
(FORMER PULASKI HOUSE)

ROUNDHOUSE PLAZA

OLD SOUTH STREET

CRAFTS AVENUE

3 STORY WOOD - FRAME APARTMENT BUILDING

NS-2

NS-1

OIL TANK

MB-1

MB-2

MB-3

MB-4

MB-5

MB-6

MB-7

MB-8

MB-9

MB-10

MB-11

MB-12

MB-13

MB-14

MB-15

MB-16

MB-17

MB-18

MB-19

MB-20

MB-21

MB-22

MB-23

PH-1

PH-2

PH-3

PH-4

NOTE: HISTORICAL FEATURES APPROXIMATELY LOCATED
FROM SANBORN MAPS.

LEGEND

--- SITE LIMITS

--- HISTORICAL FEATURE

M&E Metcalf & Eddy

FIGURE 1 - SOIL GAS SAMPLE LOCATIONS PLAN
ROUNDHOUSE PARKING LOT
NORTHAMPTON, MASSACHUSETTS
DEC. 2001 JCM AIR_PLA NG 1" = 60'

APPENDIX D
BORING LOGS

proposed
1-4

O'REILLY, TALBOT & OKUN ASSOCIATES, INC.
ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

HAND AUGERED BORING RECORD

PROJECT: Mid Rise **PROJECT NO.:** 285-03-01
CITY/STATE: Wash
SAMPLING PERSONNEL: Val Watanabe Andy Pelinger
DATE: 6/73/03 **WEATHER:** overcast ~70%

SAMPLE DESIGNATION: 1 H-1 **SAMPLING SEQUENCE No.** 1 of 3

EQUIPMENT USED: hand auger

EASE OF ADVANCEMENT: EASY / AVERAGE / DIFFICULT

OBSERVATIONS:

MATERIALS ENCOUNTERED (soil description):

claymies + sandy/gravel

soft, wet at ~6-8"

hole collapsed,

couldn't advance.

collected auger cuttings 0-2', compressed

ODOR: None / Petroleum / Other (describe): PID = 0

SAMPLE BOTTLES:

ANALYSIS	BOTTLES (number & type)	PRESERVATIVE (type&amount)
EPH, PCBs	1 amber 4 oz	---
LA, VP-13, Ba	1 clear 3 oz	---

MISC. NOTES/LOCATION SKETCH:

placed well point consisting of
2' screen driven to depth of 1' by
Plastic cap (not secure)

see map
near edge of swamp

p-3

O'REILLY, TALBOT & OKUN ASSOCIATES, INC.
ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

HAND AUGERED BORING RECORD

PROJECT: Mill River **PROJECT NO.:** 285-03-01
CITY/STATE: N.H.
SAMPLING PERSONNEL: V.W. A.R.
DATE: 1/23/03 **WEATHER:** overcast, 70's
SAMPLE DESIGNATION: 09:40 1H-2 **SAMPLING SEQUENCE No.** 2 of 3
EQUIPMENT USED: hand auger
EASE OF ADVANCEMENT: EASY / AVERAGE / DIFFICULT

OBSERVATIONS:

MATERIALS ENCOUNTERED (soil description):

length 0-2.5' composite
organics overlying mottled clay

ODOR: None / Petroleum / Other (describe): PID = ND

SAMPLE BOTTLES:

ANALYSIS	BOTTLES (number & type)	PRESERVATIVE (type&amount)
SiO ₂ , FeO, EPH (w/ingest)	2 - 1 oz amber	—
Pb, B, Cu, CN	2 - 8 oz clear	—

MISC. NOTES/LOCATION SKETCH:

Extra bottles for ms/msd

Exit Bldg

edge of water

0-1H-2

O'REILLY, TALBOT & OKUN ASSOCIATES, INC.
ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

HAND AUGERED BORING RECORD

P.2

PROJECT: Mill R. PROJECT NO.: 285-0301
CITY/STATE: Doyle
SAMPLING PERSONNEL: J.W. An
DATE: 6/23/03 WEATHER: overcast TC's

SAMPLE DESIGNATION: LH-3 SAMPLING SEQUENCE No. 3 of 3

EQUIPMENT USED: hand auger

EASE OF ADVANCEMENT: EASY AVERAGE / DIFFICULT

OBSERVATIONS:

MATERIALS ENCOUNTERED (soil description): water ~ 1' b.g.
oxigenics overlying

ODOR: None / Petroleum / Other (describe): PID = ND

SAMPLE BOTTLES:

ANALYSIS	BOTTLES (number & type)	PRESERVATIVE (type&amount)
EPA w/target PCBs	1 amber 4.02	—
CN PP-13, Ba	1 clear 802	—

MISC. NOTES/LOCATION SKETCH:

impossible 0-2'

Feet Bldg.

Sinking / Poured H₂O

park

LH₃

proposed location pt

O'REILLY, TALBOT & OKUN ASSOCIATES, INC.
ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

HAND AUGERED BORING RECORD

PROJECT: Mill River **PROJECT NO.:** 285-03-01
CITY/STATE: Northampton MA
SAMPLING PERSONNEL: Pat Watanabe
DATE: 6/30/03 **WEATHER:** _____

SAMPLE NAME: 1H4 **Depth:** 1' **Sampling Sequence No.** 1 of 1

EQUIPMENT USED: Hand auger / shovel / other: _____

EASE OF ADVANCEMENT: EASY / AVERAGE / DIFFICULT **Total depth:** 1'

OBSERVATIONS:

MATERIALS ENCOUNTERED (soil description): very rocky
reluctant 5x attempting to go deeper

ODOR: None / Petroleum / Other (describe): _____

PID Reading: ND ppmv referenced to benzene

SAMPLE BOTTLES:

ANALYSIS	BOTTLES (number & type)	PRESERVATIVE (type&amount)
EPH, SVOC, PCB, PAH	1-402 amber	—
metals, etc	1-302 clear glass	—

MISC. NOTES/LOCATION SKETCH:

S side of circular hummock in middle of unpaved
roadway Area 1

river
dike
unpaved roadway
1H4

O'REILLY, TALBOT & OKUN ASSOCIATES, INC.
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HAND AUGERED BORING RECORD

PROJECT: Mill River PROJECT NO.: 285-03-01
CITY/STATE: Northampton MA
SAMPLING PERSONNEL: Jack Weidman
DATE: 9/30/03 WEATHER: _____

SAMPLE DESIGNATION: LH-5 SAMPLING SEQUENCE No. 1
EQUIPMENT USED: shovel, stainless steel well point, sand pack
EASE OF ADVANCEMENT: EASY / AVERAGE / DIFFICULT

OBSERVATIONS:

MATERIALS ENCOUNTERED (soil description): _____

wet dk brown mucky/silty

ODOR: None / Petroleum / Other (describe): swampy

SAMPLE BOTTLES:

ANALYSIS	BOTTLES (number & type)	PRESERVATIVE (type&amount)
	<u>no soils collected</u>	
	<u>for GW only due to LH too silty</u>	

MISC. NOTES/LOCATION SKETCH:

swampy

+1H5 ~30 ft N of prev well point,
closer to water

+1H4

(p.16)

O'REILLY, TALBOT & OKUN ASSOCIATES, INC.
ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

HAND AUGERED BORING RECORD

PROJECT: Mill River PROJECT NO.: 285-03-01
CITY/STATE: Northampton MA
SAMPLING PERSONNEL: Neil L. Lumbert, Cindy Robinson
DATE: 6/10/03 WEATHER: Sunny, ~80°F
SAMPLE DESIGNATION: 2H1 SAMPLING SEQUENCE No. 2 of 9
EQUIPMENT USED: hand auger

EASE OF ADVANCEMENT: EASY / AVERAGE / DIFFICULT

OBSERVATIONS:

MATERIALS ENCOUNTERED (soil description):

AK brn. silty sand

PID=ND

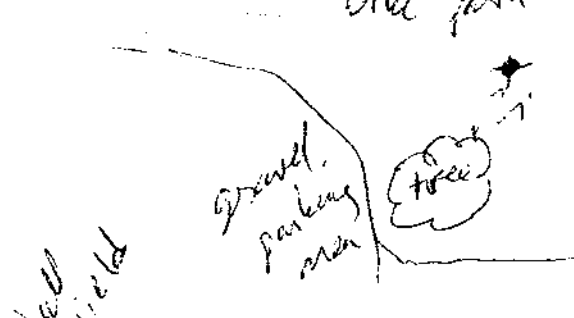
ODOR: None Petroleum / Other (describe):

SAMPLE BOTTLES:

ANALYSIS	BOTTLES (number & type)	PRESERVATIVE (type&amount)
<u>RE, ER, CN, metal, B₁</u>	<u>1 amber 4oz.</u>	
	<u>1 clear (VMS)</u>	

MISC. NOTES/LOCATION SKETCH:

depth ~5.5-6.0' wet
composited sample from 0-6' for lab.
bike path



P-17

O'REILLY, TALBOT & OKUN ASSOCIATES, INC.
ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

HAND AUGERED BORING RECORD

PROJECT: Mill R. **PROJECT NO.:** _____

CITY/STATE: NH

SAMPLING PERSONNEL: W. A. R.

DATE: 6/10/03 **WEATHER:** _____

SAMPLE DESIGNATION: 4H5 2H7 **SAMPLING SEQUENCE No.** 3 of 3

EQUIPMENT USED: hand auger

EASE OF ADVANCEMENT: EASY / AVERAGE / DIFFICULT

OBSERVATIONS:

MATERIALS ENCOUNTERED (soil description): upper = leaf detritus, organic

lower = fine brown sand, some silt

ODOR: None / Petroleum / Other (describe): NO - ND

SAMPLE BOTTLES:

ANALYSIS	BOTTLES (number & type)	PRESERVATIVE (type&amount)
EPH, SUC, PCB, PAH, B, CN	1 4 oz amber	
	composited and for lab analysis	

MISC. NOTES/LOCATION SKETCH:

depth 5.5 - 6.0'

bike path

2H7

3 1/2 trees

bike path

new pole

#11

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HAND AUGERED BORING RECORD

PROJECT: M-R PROJECT NO.: _____

CITY/STATE: Norfolk

SAMPLING PERSONNEL: V.W. AR.

DATE: 6/6/03 WEATHER: _____

SAMPLE DESIGNATION: 2H3 SAMPLING SEQUENCE No. 4 of 9

EQUIPMENT USED: hand auger

EASE OF ADVANCEMENT: EASY / AVERAGE / DIFFICULT

OBSERVATIONS:

MATERIALS ENCOUNTERED (soil description): dk. brn. organic rich soil

ODOR: None / Petroleum / Other (describe): PID ND

SAMPLE BOTTLES:

ANALYSIS	BOTTLES (number & type)	PRESERVATIVE (type&amount)
<u>EPH, PCBs, CN, metals</u>	<u>1 - 4 oz amber</u>	<u>—</u>

MISC. NOTES/LOCATION SKETCH:

west
depth 4'

← bike path →

0.700 d11

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HAND AUGERED BORING RECORD

PROJECT: M.P. **PROJECT NO.:** _____
CITY/STATE: DOH
SAMPLING PERSONNEL: Val, Andy
DATE: 6/10/03 **WEATHER:** ~80 F

SAMPLE DESIGNATION: 2H4 **SAMPLING SEQUENCE No.** 5 of 9

EQUIPMENT USED: hand auger

EASE OF ADVANCEMENT: EASY / AVERAGE / DIFFICULT
rocky. moved location
5X

OBSERVATIONS:

MATERIALS ENCOUNTERED (soil description):

upper 6" organic, then s-c sand, little gravel (fist) (dry)
depth 0-3.5' (refusal)

ODOR: None Petroleum / Other (describe): NO ND

SAMPLE BOTTLES:

ANALYSIS	BOTTLES (number & type)	PRESERVATIVE (type&amount)
ESDOC, EPH, PCB, PBT	1 4oz amber	
PPH3 metals, CN	1 8 oz clear	metals, CN none

MISC. NOTES/LOCATION SKETCH:

old bridge abutment
 15' laterally
 2H4

bike path

1.26

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HAND AUGERED BORING RECORD

PROJECT: M:11 R. **PROJECT NO.:** _____
CITY/STATE: Norfolk
SAMPLING PERSONNEL: VW. AR.
DATE: 6/10/03 **WEATHER:** hot

SAMPLE DESIGNATION: 2H5 **SAMPLING SEQUENCE No.** 6 of 9

EQUIPMENT USED: hand auger

EASE OF ADVANCEMENT: EASY / AVERAGE / **DIFFICULT** moved 3x
rocky

OBSERVATIONS:

MATERIALS ENCOUNTERED (soil description): f-c sand and gravel fill

ODOR: None / Petroleum / Other (describe): PCB ND

SAMPLE BOTTLES:

ANALYSIS	BOTTLES (number & type)	PRESERVATIVE (type&amount)
EPH, PCBs, PP, Bz, CN	1 402 amber	_____

MISC. NOTES/LOCATION SKETCH:

refusal at ~3 to 3.5'
sample 0th 3-3.5'

pile #12

0.21
203-424-2022

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HAND AUGERED BORING RECORD

PROJECT: M71 R PROJECT NO.: _____

CITY/STATE: NH

SAMPLING PERSONNEL: W. A. R.

DATE: 6/10/03 WEATHER: 80's

SAMPLE DESIGNATION: 2H6 SAMPLING SEQUENCE No. 1 of 9

EQUIPMENT USED: hand auger

EASE OF ADVANCEMENT: EASY / AVERAGE / DIFFICULT

OBSERVATIONS:

MATERIALS ENCOUNTERED (soil description): trash, f.c. sand, little gravel (fill)

ODOR: None / Petroleum / Other (describe): PID = 0

SAMPLE BOTTLES:

ANALYSIS	BOTTLES (number & type)	PRESERVATIVE (type&amount)
EPH, PCBs, SVOC	1 - 4 oz amber	—
CN, metals	1 - 8 oz clear	—

MISC. NOTES/LOCATION SKETCH:

depth = 5.5'

2H6
6 feet
#13

bike path

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ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

HAND AUGERED BORING RECORD

PROJECT: M.H. River PROJECT NO.: 285 03-01
CITY/STATE: Northampton MA
SAMPLING PERSONNEL: Val Watanabe
DATE: 10/14/03 WEATHER: _____

SAMPLE DESIGNATION: 4H6 SAMPLING SEQUENCE No. 1

EQUIPMENT USED: shovel; stainless steel well point; silica sand

EASE OF ADVANCEMENT: EASY / AVERAGE / DIFFICULT

OBSERVATIONS:

MATERIALS ENCOUNTERED (soil description):

upper 6" silty muck
lower 18" m-c rounded coarse sand,
little gravel (wet)

PID: ND

ODOR: None / Petroleum / Other (describe): slight odor. naphthalene/oil?

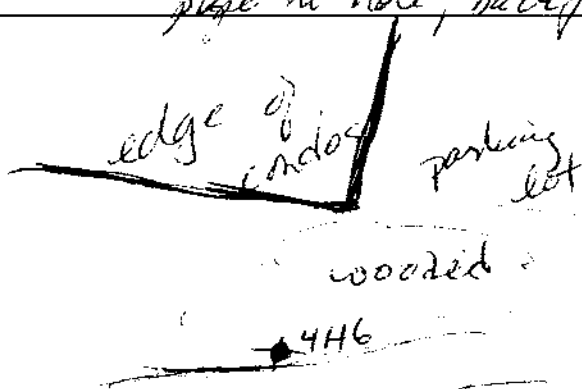
SAMPLE BOTTLES:

ANALYSIS	BOTTLES (number & type)	PRESERVATIVE (type&amount)
0.5' depth sample: VPH	VPH 1-40 ml VOA	meOH
SOC, EPH	1 402 amber glass	—
metals, CN	1 8-oz clear glass	—

MISC. NOTES/LOCATION SKETCH:

Installed hand-placed steel well point. Dug hole to 2' w/ shovel (hole kept collapsing due to wet) placed pipe in hole, backfilled w/silica sand for filter pack. (from home depot)

Hand driven well point about 2' from edge of water. May get seasonally underwater here.



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LOG OF BORING 2W-9

Page 1 OF 1

PROJECT Historic Mill River
 DRILLING CONTRACTOR Seaboard Environmental Drilling
 DRILLING EQUIPMENT B-53

FOREMAN
 Jeff Nutsch

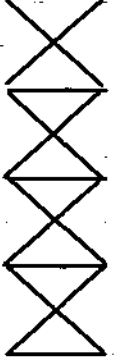
LOCATION Northampton, MA
 DATE STARTED 06/27/2003
 COMPLETION DEPTH 10'

PROJECT NO 10285 03 01
 DATE FINISHED 06/27/2003
 GROUND SURFACE ELEV DATUM

TYPE BIT Hollow Stem Auger
 CASING SIZE & TYPE OF CORE BARREL
 CASING HAMM WEIGHT DROP
 SAMPLER Split Spoon WEIGHT DROP
 HAMMER 140 30"

No. Sample 4
 TIME
 WATER LEVEL (F.T.)
 BORING
 LOCATION Western corner of Veterans field
 ENGINEER/GEOLOGIST Val Watanabe

UNDIST
 FIRST COMPL HR

SAMPLES	DEPTH FT.	PENETR. RESIST. BL/6 IN.	REC. IN.	TYPE/ NO.	DESCRIPTION	FIELD MEASUREMENTS	SOIL DESCRIPTION	REMARKS
		3-3-3-2	13-24	S-1 (0'-2')	Loose, dark brown, fine SAND and SILT, little roots (topsoil)	ND	TOPSOIL	
		3-7-8-8	12-24	S-2 (2'-4')	Dark brown, fine SAND and SILT, little gravel	ND	SILT and SAND	
	5	7-12-7-15	10-24	S-3 (4'-6')	Black Silt, fine to coarse SAND, little gravel (rock in spoon tip), wet, organic swamp odor	ND		
		22-16-17-13	14-24	S-4 (6'-8')	Fine to coarse SAND and GRAVEL, little silt	ND		
	10				Auger refusal at 10'			
	15							
	20							
	25							

Remarks

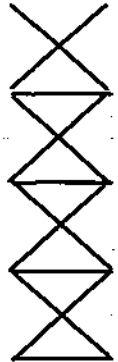
- Soil screened in field using TEI 580B photo ionization detector with 10.2 eV lamp referenced to PPM of Benzene in air. Readings in PPM. "ND" indicates none detected.
- Well set at 10' PVC screen (10'-2'), PVC riser (2'-ground surface), Sand (10'-1') Bentonite (1'-0.5'), Concrete (0.5'-ground surface), stand pipe.
- Proposed location P-6.

O'REILLY, TALBOT & OKUN ASSOCIATES, INC.
ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

LOG OF BORING 2B-10

Page 1 OF 1

PROJECT Historic Mill River DRILLING CONTRACTOR Seaboard Environmental Drilling DRILLING EQUIPMENT B-53 TYPE BIT Hollow Stem Auger CASING CASING HAMMER SAMPLER Split Spoon SAMPLER HAMMER	FOREMAN Jeff Nitsch SIZE & TYPE OF CORE BARREL WEIGHT DROP WEIGHT 140 DROP 30" SAMPLES	LOCATION Northampton, MA DATE STARTED 06/27/2003 COMPLETION DEPTH 8' No. Sample 4 TIME WATER LEVEL (FT.) BORING LOCATION Near first small maple tree, Val Watanabe ENGINEER/GEOLOGIST
		PROJECT NO. J0285 03 01 DATE FINISHED 06/27/2003 GROUND SURFACE ELEV DATUM FIRST UNDIST COMPL HR

SAMPLES	DEPTH FT.	PENEYR. RESIST. BL/6 IN.	REC. IN.	TYPE/ NO.	DESCRIPTION	FIELD MEASUREMENTS	SOIL DESCRIPTION	REMARKS
		2.4-6.7	18-24	S-1 (0'-2')	TOPSOIL SOD, underlain by dark brown, fine SAND	ND	TOPSOIL	
		3.4-4.4	14-24	S-2 (2'-4')	Loose, dark brown, SILT (damp)	ND	SILT	
	5	3.3-1.2	13-24	S-3 (4'-6')	Very loose, orange-brown, mottled SILT (wet)	ND		
		2.2-1.3	14-24	S-4 (6'-8')	Very loose, brown, fine to medium SAND (wet)	ND	SAND	
End of exploration at 8'								

Remarks

1. Soil screened in field using TEI 580B photo ionization detector with 10.2 eV lamp referenced to PPM of Benzene in air. Readings in PPM. "ND" indicates none detected.
2. Proposed location P-8

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LOG OF BORING 2B-11

Page 1 OF 1

PROJECT Historic Mill River
 DRILLING CONTRACTOR Seaboard Environmental Drilling
 DRILLING EQUIPMENT H-53

FOREMAN
 Jeff Nisch

LOCATION Northampton, MA
 DATE STARTED 06/27/2003
 COMPLETION DEPTH 8'

PROJECT NO 10285 03 01
 DATE FINISHED 06/27/2003
 GROUND SURFACE ELEV
 DATUM

TYPE BIT Hollow Stem Auger
 CASING HAMM SIZE & TYPE OF CORE BARREL
 SAMPLER Split Spoon
 HAMMER WEIGHT 140
 DROP 30"

No. Sample 4
 TIME
 WATER LEVEL (F.T.)
 BORING
 LOCATION
 ENGINEER/GEOLOGIST
 FIRST
 UNDIST.
 COMPL
 IIR
 OUTFIELD
 Val Watanabe

SAMPLES	DEPTH FT.	PENETR. RESIST. BL/6 IN.	REC. IN.	TYPE/ NO.	DESCRIPTION	FIELD MEASUREMENTS	SOIL DESCRIPTION	REMARKS
		2.2-4.3	14/24	S-1 (0'-2')	Loose, dark brown, fine SAND and SILT (topsoil); trace coal	ND	TOPSOIL	
		10.5-5.4	8/24	S-2 (2'-4')	Loose, fine to medium SAND (wet)	ND	SAND	
	5	1.6-10.13	12/24	S-3 (4'-6')	Medium dense, fine to coarse SAND (wet)	ND		
		1.6-10.13	13/24	S-4 (6'-8')	Medium dense, gray, fine SAND (wet)	ND		
End of exploration at 8'								

Remarks:

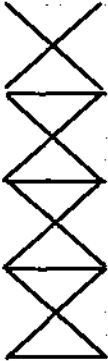
1. Soil screened in field using TE1080B photo ionization detector with 10.2 eV lamp referenced to PPM of Benzene in air. Readings in PPM. "ND" indicates none detected.
2. Proposed location P-9.

O'REILLY, TALBOT & OKUN ASSOCIATES, INC.
ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

LOG OF BORING 2B-12

Page **1** OF **1**

PROJECT	Historic Mill River	LOCATION	Northampton, MA	PROJECT NO	J0285	03	01
DRILLING CONTRACTOR	Seaboard Environmental Drilling	DATE STARTED	06/27/2003	DATE FINISHED	06/27/2003		
DRILLING EQUIPMENT	B 53	COMPLETION DEPTH	8'	GROUND SURFACE ELEV			
TYPE BIT	Hollow Stem Auger	SIZE & TYPE OF CORE BARREL		DATUM			
CASING		WEIGHT		UNDIST			
CASING HAMM		DROP		FIRST	COMPL	HR	
SAMPLER	Split Spoon	WEIGHT	140				
SAMPLER		DROP	30"				
HAMMER				ENGINEER/GEOLOGIST	Val Watanabe		

SAMPLES	DEPTH FT.	PENETR. RESIST. BL/6 IN.	REC. IN.	TYPE/ NO.	DESCRIPTION	FIELD MEASUREMENTS	SOIL DESCRIPTION	REMARKS
		2.2-4.4		S-1 (0'-2')	TOPSOIL. SOD, underlain by loose, brown, fine sand and silt, several pieces of coal in upper 6"	ND	TOPSOIL	
		3.3-3.7		S-2 (2'-4')	Brown, fine SAND and SILT, little medium sand	ND	SILT and SAND	
	5	6-5.4-3		S-3 (4'-6')	Top 12" Brown, fine SAND Bottom 12" Light brown, medium to coarse SAND, little gravel, trace silt (wet)	ND		
		2.2-3.7		S-4 (6'-8')	Loose, dark brown, fine to medium SAND, trace silt, wood fragments (old river bed?)	ND		
End of exploration at 8'								

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Remarks

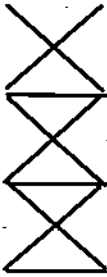
- Soil screened in field using TEI 580B photo ionization detector with 10.2 eV lamp referenced to PPM of Benzene in air. Readings in PPM. "ND" indicates none detected.
- Proposed location P 11

O'REILLY, TALBOT & OKUN ASSOCIATES, INC.
ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

LOG OF BORING 2B-13

Page 1 OF 1

PROJECT	Historic Mill River	LOCATION	Northampton, MA	PROJECT NO	J0245	03	01
DRILLING CONTRACTOR	Seaboard Environmental Drilling	DATE STARTED	06/27/2003	DATE FINISHED	06/27/2003		
DRILLING EQUIPMENT	B-53	COMPLETION DEPTH	6'	GROUND SURFACE ELEV			
TYPE BIT	Hollow Stem Auger	No. Sample	3	DATUM			
CASING		TIME		FIRST		UNDIST	HR
CASING HAMM		WATER LEVEL (FT)		COMPL			
SAMPLER	Split Spoon	BORING					
SAMPLER		LOCATION					
HAMMER		ENGINEER, GEOLOGIST			Val Watanabe		

SAMPLES	DEPTH FT.	SAMPLES		TYPE/ NO.	DESCRIPTION	FIELD MEASUREMENTS	SOIL DESCRIPTION	REMARKS
		PENETR. RESIST. BL/6 IN.	REC. IN.					
		22.2	17.24	S-1 (0'-2')	TOPSOIL/SOD, underlain by loose, brown, fine sand and silt, trace coal	ND	TOPSOIL	
		9.97	12.24	S-2 (2'-4')	Medium dense, fine SAND, trace silt (wet at 3')	ND	SAND	
	5	5.66	10.24	S-3 (4'-6')	Medium dense, brown, fine to coarse SAND, little fine gravel	ND		
End of exploration at 6'								

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Remarks

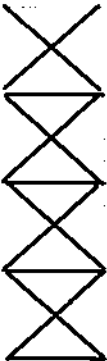
- Soil screened in field using TE1500B photo ionization detector with 10.2 eV lamp referenced to PPM of Benzene in air. Readings in PPM. "ND" indicates none detected.
- Proposed location P-12.

O'REILLY, TALBOT & OKUN ASSOCIATES, INC.
ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

LOG OF BORING 2B-14

Page 1 OF 1

PROJECT	Historic Mill River	LOCATION	Northampton, MA	PROJECT NO.	J0285	03	01
DRILLING CONTRACTOR	Seaboard Environmental Drilling	DATE STARTED	06/27/2003	DATE FINISHED	06/27/2003		
DRILLING EQUIPMENT	B 53	COMPLETION DEPTH	8'	GROUND SURFACE ELEV.			
TYPE BIT	Hollow Stem Auger	SIZE & TYPE OF CORE BARREL		DATUM			
CASING		WEIGHT		FIRST		UNDIST	HR
CASING HAMM		DROP		COMPL			
SAMPLER	Split Spoon	WHIGHT	140				
SAMPLER		DROP	30"				
HAMMER							
				LOCATION	East side Veterans field		
				ENGINEER/GEOLOGIST	Val Watanabe		

SAMPLES	DEPTH FT.	PENETR. RESIST. BL/6 IN.	REC. IN.	TYPE/ NO.	DESCRIPTION	FIELD MEASUREMENTS	SOIL DESCRIPTION	REMARKS
		3.3-4.12	14.24	S-1 (0'-2')	Dark brown, TOPSOIL/SOD, underlain by brown, fine sand and silt. little coal, brick fragments in spoon up	ND	TOPSOIL	
		7.9-7.8	12.24	S-2 (2'-4')	Medium dense, brown, fine SAND and SILT (brick fragments at top), some coal, trace brick	ND	FILL	
	5	3.5-10.3	16.24	S-3 (4'-6')	Medium dense, CLAY and SILT, brick fragments (wet)	ND		
		3.3-4.12	18.24	S-4 (6'-8')	Medium dense, clayey SILT with many pieces coal, few brick fragments (wet)	ND		
End of exploration at 8'								

10

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Remarks

1. Soil screened in field using TEI 580H photo ionization detector with 10.2 eV lamp referenced to PPM of Benzene in air. Readings in PPM. "ND" indicates none detected.
2. Proposed P 13

O'REILLY, TALBOT & GRUN ASSOCIATES, INC.
ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

LOG OF BORING 2B-15

Page **1** OF **1**

PROJECT Historic Mill River	LOCATION Northampton, MA	PROJECT NO J0285-03-01
DRILLING CONTRACTOR Seaboard Environmental Drilling	DATE STARTED 06/27/2003	DATE FINISHED 06/27/2003
DRILLING EQUIPMENT B-53	COMPLETION DEPTH 10'	GROUND SURFACE ELEV
TYPE BIT Hollow Stem Auger	No Sample 5	DATUM
SIZE & TYPE OF CORE BARREL	TIME	UNDIST
CASING	WATER LEVEL (FT.)	FIRST
CASING HAMM	BORING	COMPL
SAMPLER Split Spoon	LOCATION Next to utility building, north of Veterans field	HR
WEIGHT 140	ENGINEER GEOLOGIST Val Watanabe	
DROP 30"		

SAMPLES	DEPTH FT.	PENETR. RESIST. BL/6 IN.	REC. IN.	TYPE/ NO.	DESCRIPTION	FIELD MEASUREMENTS	SOIL DESCRIPTION	REMARKS
		2.3-3.3	12.24	S-1 (0'-2')	Loose, dark brown, fine SAND (topsoil)	ND	TOPSOIL	
		9.5-4.4	17.24	S-2 (2'-4')	Mottled orange-brown, fine SAND and SILT	ND	SILT	
	5	4.4-2.2	17.24	S-3 (4'-6')	Brown, SILT (wet at bottom)	ND		
		1.1-1.1	15.24	S-4 (6'-8')	Loose, brown, SILT (wet)	ND		
	10	1.1-2.2	18.24	S-5 (8'-10')	Loose, mottled orange-gray, clayey SILT (wet)	ND		
		End of exploration at 10'						
	15							
	20							
	25							

Remarks

1. Soil screened in field using TEI 580B photo ionization detector with 10.2 eV lamp referenced to PPM of Benzene in air. Readings in PPM. "ND" indicates none detected.
2. Proposed P-15

O'REILLY, TALBOT & OKUN ASSOCIATES, INC.
ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

LOG OF BORING 2T-1

Page 1 OF 1

PROJECT Mill River DRILLING CONTRACTOR Seaboard Environmental Drilling Geologic DRILLING EQUIPMENT Geoprobe TYPE BIT Geoprobe CASING CASING HAMM SAMPLER SAMPLER HAMMER	FOREMAN Justin SIZE & TYPE OF CORE BARREL 1.5 WEIGHT DROP WEIGHT DROP SAMPLES PENETR. RESIST. BL/6 IN. REC. IN. TYPE/ NO. DESCRIPTION	LOCATION Northampton, MA DATE STARTED 07/30/2003 COMPLETION DEPTH No Sample 4 TIME WATER LEVEL (FT) BORING LOCATION ENGINEER GEOLOGIST Rena Chadwick
--	--	---

PROJECT NO J0285 63 01
DATE FINISHED 07/30/2003
GROUND SURFACE ELEV DATUM
FIRST 13.5'
UNDIST. COMPL. HR

SAMPLES	DEPTH FT.	PENETR. RESIST. BL/6 IN.	REC. IN.	TYPE/ NO.	DESCRIPTION	FIELD MEASUREMENTS	SOIL DESCRIPTION	REMARKS
				(0'-4')	No sample taken, rocky fill		FILL	
	5							
			12-43	S-1 (4'-8')	Top 4" Brown, fine to medium, loamy SAND Middle 4" Tan, medium SAND, some pebbles, loamy Bottom 4" Tan, fine to medium SAND with some pebbles, trace clay, damp	ND		
	10							
			36-43	S-2 (8'-12')	Top 1" Brown, medium to coarse SAND Middle 2" Coarse hard BLACK MATERIAL, smells and feels like asphalt Bottom 36" Tan, reddish-tan, fine loamy SAND	ND	SAND and SILT	
	15							
			30-48	S-3 (12'-16')	Brown, fine, loamy sand, top 1' some pebbles 6" Brown, clayey SILT, almost peaty 6" Dark brown, medium SAND, some pebbles, some silt 2" Black band of fine SAND and SILT, thin rusty band of sand 4" Fine SAND with clay and silt Groundwater at 13.5'	ND		
	20							
			48-43	S-4 (16'-20')	Top 12" Brown, medium SAND with trace silt and clay Bottom 36" Red, medium SAND, typical of valley, sand is dry	ND		
	25							

End of exploration at 20'

Remarks

- Soil screened in field using TE1 S80R photo ionization detector with 10.2 eV lamp referenced to PPM of Benzene in air. Readings in PPM. "ND" indicates none detected.
- Well set at 20' 1" diameter PVC screen (20'-10'), PVC riser (10'-3' above ground surface), Bentonite (3'-ground surface), Sand (20'-3'), stand pipe.

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ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

LOG OF BORING 2T-2

Page 1 OF 1

PROJECT: Mill River	LOCATION: Northampton, MA	PROJECT NO: J0285 03 01
DRILLING CONTRACTOR: Seaboard Environmental Drilling Geologic	DATE STARTED: 07/30/2003	DATE FINISHED: 07/30/2003
DRILLING EQUIPMENT: Geoprobe	COMPLETION DEPTH: 11'	GROUND SURFACE ELEV. DATUM
TYPE BIT: Geoprobe	No Sample 4	UNDIST
CASING: 1.5	TIME	FIRST
CASING HAMM: WEIGHT	WATER LEVEL (FT):	8"
SAMPLER: WEIGHT	BORING	COMPL
SAMPLER HAMMER: DROP	ENGINEER GEOLOGIST: Rena Chadwick	HR

SAMPLES	DEPTH FT.	PENETR. RESIST. BL/6 IN.	REC. IN.	TYPE/ NO.	DESCRIPTION	FIELD MEASUREMENTS	SOIL DESCRIPTION	REMARKS
							FILL	
			36-48	S-1 (0'-4')	Top 24" Brown, medium SAND with some silt Bottom 12" Brown, fine to medium SAND, trace silt, loamy	ND		
	5		24-48	S-2 (4'-8')	Brown, medium SAND with some silt	ND		
					Groundwater -8"			
	10		36-36	S-3 (8'-11')	Top 12" Tan-brown, fine to medium SAND, some silt and clay Middle 12" Fine to medium SAND with silt, some organics (roots), broken glass Bottom 12" Red, medium to fine SAND (possible weathered rock) Refusal at 11' End of exploration at 11'	ND		
	15							
	20							
	25							

Remarks


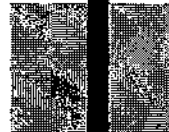
- Soil screened in field using TEI 280B photo ionization detector with 10.2 eV lamp referenced to PPM of Benzene in air. Readings in PPM. "ND" indicates none detected.
- Well set at 11" 1" diameter PVC screen (11'-5"), PVC riser (5'-3" above ground surface), Bentonite (1" ground surface), Sand (11'-3"), stand pipe.

O'REILLY, TALBOT & OKUN ASSOCIATES, INC.
ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

LOG OF BORING 2T-3

Page 1 OF 1

PROJECT	Mt. River	LOCATION	Northampton, MA	PROJECT NO	J0285	03	01
DRILLING CONTRACTOR	Seaboard Environmental Drilling Geologic	DATE STARTED	07/30/2003	DATE FINISHED	07/30/2003		
DRILLING EQUIPMENT	Geoprobe	COMPLETION DEPTH	3'	GROUND SURFACE ELEV			
				DATUM			
TYPE BIT	Geoprobe	SIZE & TYPE OF CORE BARREL	1.5	TIME		FIRST	UNDIST
CASING		WEIGHT		WATER LEVEL (FT)	4'	COMPL	HR
CASING HAMM		DROP		BORING			
SAMPLER				LOCATION			
SAMPLER				ENGINEER GEOLOGIST	Rena Chadwick		
HAMMER							

SAMPLES	DEPTH FT.	SAMPLES			DESCRIPTION	FIELD MEASUREMENTS	SOIL DESCRIPTION	REMARKS
		PENETR. RESIST. BL/6 IN.	REC. IN.	TYPE/ NO.				
	5			S-1 (0'-4')	Top 12" Brown, fine SAND, lumpy, some silt and clay, organics (wood chips, roots) Bottom 18" Brown, fine to medium SAND, few small pebbles wet bottom 2"	ND	SAND	
				S-2 (4'-8')	Top 12" Fine to medium SAND, some silt clay, few pebbles Bottom 12" Brown-black, coarse SAND with some pebbles, trace silt	ND		
End of exploration at 8'								

Remarks

1. Soil screened in field using TEI 580B photo ionization detector with 10.2 eV lamp referenced to PPM of Benzene in air. Readings in PPM. "ND" indicates none detected.
2. Well set at 8' 1" diameter PVC screen (8'-5'), PVC riser (5'-3" above ground surface), Bentonite (3'-ground surface), Sand, (8'-3'), stand pipe.

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ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

LOG OF BORING 3W-1

Page 1 OF 1

PROJECT Historic Mill River (Area 3) DRILLING CONTRACTOR Seaboard Environmental Drilling DRILLING EQUIPMENT B-51 TYPE BIT Hollow Stem Auger CASING CASING HAMM SAMPLER Split Spoon SAMPLER HAMMER	FOREMAN Frank SIZE & TYPE OF CORE BARREL WEIGHT DROP WEIGHT 140 DROP 30" SAMPLES	LOCATION Northampton, MA DATE STARTED 09/18/2003 COMPLETION DEPTH 18' TIME 9 WATER LEVEL (FT) BORING LOCATION Old South St. Parking Lot, near entrance ENGINEER GEOLOGIST Rena Chadwick
PROJECT NO J0285 03 01 DATE FINISHED 09/18/2003 GROUND SURFACE ELEV DATUM UNDIST COMPL HR		

SAMPLES	DEPTH FT.	PENETR. RESIST. BL/6 IN.	REC. IN.	TYPE/ NO.	DESCRIPTION	FIELD MEASUREMENTS	SOIL DESCRIPTION	REMARKS
		14.21-25.27	12.24	S-1 (0'-2')	Augered through asphalt Brown, medium SAND (fill) with some rock fragments and asphalt	ND	ASPHALT FILL	
		11.6-5.5	9.24	S-2 (2'-4')	Top 4" Tan, medium SAND, some fine sand Middle 2" Layer of CLAY with some silt and fine sand (very cohesive) (fill) Bottom 3" Dark brown, medium SAND with some fine sand	ND		
	5	7.18-10.9	6.24	S-3 (4'-6')	Top 3" Tan-brown, medium SAND with trace fine sand (fill) Middle 1" ASPHALT Bottom 2" Brown, medium SAND with some silt (fill)	ND		
		7.8-11.22	6.24	S-4 (6'-8')	Top 3" Brown, medium sandy FILL with some rock fragments Bottom 3" ASPHALT, COAL slag and ROCK fragments	ND		
	10	19.7-4.4	0.24	S-5 (8'-10')	No Recovery Auger observation, clayey material, spoon wet	ND		
		4.4-4.4	4.24	S-6 (10'-12')	Brown, medium SAND with some black portions, naphthalene odor	ND		
		4.4-5.5	6.24	S-7 (12'-14')	Gray, clayey SILT, trace fine sand, few wood pieces, trace small rock fragments (fill)	ND		
	15	9.7-5.6	9.24	S-8 (14'-16')	Tan-gray, CLAY with trace silt, very cohesive with few wood fragments	ND		
		8.5-4.7	8.24	S-9 (16'-18')	Top 4" Tan-brown, medium to fine SAND, some silt and clay, trace wood Bottom 4" Gray-brown, medium to fine SAND some silt and clay, one piece brick	ND		
	20				End of exploration at 18'			
	25							

Remarks

- Soil screened in field using TEI 580B photo ionization detector with 10.2 eV lamp referenced to PPM of Benzene in air. Readings in PPM. "ND" indicates none detected
- Well set at 18" PVC screen (18'-8"), PVC riser (8'-ground surface). Sand (18'-6"), Bentonite (6'-4"), Cutting (4'-0.5"), Curb box (0.5'-ground surface)

O'REILLY, TALBOT & OKUN ASSOCIATES, INC.
ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

LOG OF BORING 3W-2

Page 1 OF 1

PROJECT Historic Mill River (Area 3)
 DRILLING CONTRACTOR Seaboard Environmental Drilling
 DRILLING EQUIPMENT B-53

FOREMAN
 Frank

LOCATION Northampton, MA
 DATE STARTED 09/18/2003
 COMPLETION DEPTH 21'
 No. Sample 10
 TIME
 WATER LEVEL (FT)
 BORING
 LOCATION
 ENGINEER GEOLOGIST

PROJECT NO J0283 01 01
 DATE FINISHED 09/18/2003
 GROUND SURFACE ELEV DATTM
 UNDIST
 FIRST
 HR
 Old South St., parking lot near dumpster
 Rena Chadwick

TYPE BIT Hollow Stem Auger
 CASING HAMMI
 SAMPLER Splt. Spoon
 SAMPLER HAMMER

SIZE & TYPE OF CORE BARREL
 WEIGHT 140
 DROP 30"

SAMPLES	DEPTH FT.	PENETR. RESIST. BL/6 IN.	REC. IN.	TYPE/ NO.	DESCRIPTION	FIELD MEASUREMENTS	SOIL DESCRIPTION	REMARKS
					Augered through asphalt	ND	ASPHALT FILL	
	5	8-12-14-15	8-24	S-1 (1'-3')	Brown, medium SAND (fill), some rock fragments, trace fine sand			
		8-9-10-6	6-24	S-2 (3'-5')	Brown, medium SAND (fill), trace rock fragments, trace fine sand, little asphalt	ND		
		20-81-29-15	6-24	S-3 (5'-7')	Top 3" Very dense, brown, medium SAND, trace fine sand, some rock fragments, some asphalt fragments Bottom 3" ROCK fragments and rock powder	ND		
		15-16-29-22	7-24	S-4 (7'-9')	Top 1" SILT, some clay with wood fibers, cohesive Bottom 6" Brown, medium SAND, dense, sand, some fine sand and rock fragments	0.2		
	10	33-12-9-7	8-24	S-5 (9'-11')	Brown, medium to fine SAND with some silt, trace clay, one brick fragment	0.2		
		7-9-4-7	8-24	S-6 (11'-13')	Brown, medium SAND, few pieces coal, faint naphthalene odor	0.3		
	15	9-12-8-9	12-24	S-7 (13'-15')	Brown, medium SAND with some fine sand and silt, few rock fragments, few pieces glass and wood (fill), faint odor	0.7		
		16-21-20-15	9-24	S-8 (15'-17')	Dark brown to somewhat blackish slight sheen on water in spoon, distinct naphthalene odor, some rock fragments	4.5		
		12-9-4-3	24-24	S-9 (17'-19')	Top 18" Medium to coarse SAND with some fine sand and rock fragments, dark brown-black, sheen and naphthalene odor Bottom 6" Tan CLAY and SILT with some fine sand, very cohesive	11.8		
	20	8-2-1-1	24-24	S-10 (19'-21')	Top 6" Cave in from above, medium to coarse SAND with some fine sand, notable dark brown-black sheen and naphthalene odor Bottom 18" Tan, very cohesive, CLAY with trace silt and fine sand, faint naphthalene odor	13.5		
					End of exploration at 21'			

25

Remarks:

1. Soil screened in field using TEI 580B photo ionization detector with 10.2 eV lamp referenced to PPM of Benzene in air. Readings in PPM. "ND" indicates none detected.
2. Well set at 20' PVC screen (20'-10'), PVC riser (10'-ground surface), Sand (20'-8'), Bentonite (8'-6'), Cuttings (6'-3'), Sand (3'-ground surface), Flush mount curb box.

O'REILLY, TALBOT & OKUN ASSOCIATES, INC.
ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

LOG OF BORING 4 B-1

Page 1 OF 1

PROJECT Historic Mill River (Section 4)
 DRILLING CONTRACTOR Seaboard Environmental Drilling
 DRILLING EQUIPMENT B-53









FOREMAN
 Tiny

LOCATION Northampton, MA
 DATE STARTED 06/04/2003
 COMPLETION DEPTH 17'

PROJECT NO J0285 03 01
 DATE FINISHED 06/04/2003
 GROUND SURFACE ELEV
 DATUM
 UNDIST.
 FIRST COMPL. HR.
 Andy Rolinger Valerie Watanabe

TYPE BIT Hollow Stem Auger
 CASING Casing
 CASING HAMM. Split Spoon
 SAMPLER
 SAMPLER
 HAMMER

SIZE & TYPE OF CORE BARRIL
 WEIGHT DROP
 WEIGHT DROP
 140 30"

SAMPLES	DEPTH FT.	PENETR. RESIST. BL/6 IN.	REC. IN.	TYPE/ NO.	DESCRIPTION	FIELD MEASUREMENTS	SOIL DESCRIPTION	REMARKS
		8 12-9-37 for 4"	8-24	S-1 (0'-2')	Medium dense, brown, fine to medium SAND, little coarse sand, fine gravel, few black particles (coal?), little silt	ND	FILL	
		4 8-4-4	15-24	S-2 (3'-5')	Medium dense, brown, fine to medium SAND and SILT	ND		
	5	17 15-7-5	6-24	S-3 (5'-7')	Medium dense, brown, fine to medium SAND and SILT, trace black particles (coal?)	0.4		
		5-7 8-5-0 for 4"	10-24	S-4 (7'-9')	Medium dense, brown, fine to medium SAND and SILT, little coarse sand, trace black particles (coal?)	0.4		
	10	4 5-6-11	1-24	S-5 (10'-12')	Medium dense, brown, fine to medium SAND and SILT, wet, not enough soil for sample	ND		
		5-4-5-5	2-24	S-6 (12'-14')	Loose, brown, fine to medium SAND and SILT, wet, piece of wood in sample spoon	ND		
	15	2-4-6-4	12-24	S-7 (14'-16')	Medium dense, gray, fine to medium SAND, little silt, piece of wood in spoon, wet	0.6		
		5 15-2-3	6-24	S-8 (16'-18')	Medium dense, gray, fine to coarse SAND and fine GRAVEL, little silt, wet Auger refusal at 17'	0.6		
	20							
	25							

Remarks:

1 Soil screened in field using TEI 580B photo ionization detector with 10.2 eV lamp referenced to PPM of Benzene in air. Readings in PPM. "ND" indicates none detected

O'REILLY, TALBOT & OKUN ASSOCIATES, INC.
ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

LOG OF BORING 4 B-2

Page 1 OF 1

PROJECT Histone Mill River (Section 4)	LOCATION Northampton, MA	PROJECT NO J0283 03 01
DRILLING CONTRACTOR Seaboard Environmental Drilling	DATE STARTED 06/04/2003	DATE FINISHED 06/04/2003
DRILLING EQUIPMENT B-53	COMPLETION DEPTH 18'	GROUND SURFACE ELEV DATUM
TYPE BIT Hollow Stem Auger	No Sample 9	UNDIST
CASING	TIME	FIRST COMPL HR
CASING HAMM	WATER LEVEL (FT)	
SAMPLER	BORING	
SAMPLER HAMMER Split Spoon	LOCATION	
	ENGINEER GEOLOGIST	Andy Rolinger

SAMPLES	DEPTH FT.	SAMPLER		TYPE/ NO.	DESCRIPTION	FIELD MEASUREMENTS	SOIL DESCRIPTION	REMARKS
		WEIGHT 140	DROP 30"					
		17 14 13	14 24	S-1 (0'-2')	Medium dense, brown, TOPSOIL, little fine to coarse sand and fine gravel	0.6	TOPSOIL	
		11 8 8 9	10 24	S-2 (2'-4')	Medium dense, brown, fine to medium SAND, trace silt	0.6	SAND and SILT	
	5	4 4 5 6	10 24	S-3 (4'-6')	Loose, brown, fine to medium SAND and SILT	0.9		
		3 4 5 6	18 24	S-4 (6'-8')	Loose, brown, fine to medium SAND and SILT	0.6		
	10	3 3 7 5	10 24	S-5 (8'-10')	Loose, brown, fine to medium SAND and SILT	0.4		
		1 1 2 1	20 24	S-6 (10'-12')	Very loose, brown, fine to medium SAND and SILT, wet	0.6		
		3 6 6 10	18 24	S-7 (12'-14')	Top 9" Medium dense, fine to medium SAND and SILT, wet Bottom 9" Medium dense, fine SAND and clayey SILT, wet	0.1		
	15	9 9 9 10	24 24	S-8 (14'-16')	Medium dense, grayish brown, fine SAND and clayey SILT, wet	0.1		
		6 7 7 11	24 24	S-9 (16'-18')	Medium dense, gray, medium to coarse SAND, little fine sand and silt, wet	0.6		
	20	End of exploration at 18'						

Remarks:

1 Soil screened in field using TFI 580B photo ionization detector with 10.2 eV lamp referenced to PPM of Benzene in air. Readings in PPM. "ND" indicates none detected.

1. Soil screened in field using TEI 580B photo ionization detector with 10.2 eV lamp referenced to PPM of Benzene in air. Readings in PPM. "ND" indicates none detected.

O'REILLY, TALBOT & OKUN ASSOCIATES, INC.
ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

LOG OF BORING 4 W-1

Page **1** OF **1**

PROJECT	Historic Mill River (Section 4)	LOCATION	Northampton, MA	PROJECT NO	10285 03 01
DRILLING CONTRACTOR	Seaboard Environmental Drilling	DATE STARTED	06/04/2003	DATE FINISHED	06/04/2003
DRILLING EQUIPMENT	B-53	COMPLETION DEPTH	22'	GROUND SURFACE ELEV	
TYPE BIT	Hollow Stem Auger	No. Sample	10	DATUM	
CASING		TIME		FIRST	UNDIST
CASING HAMM		WATER LEVEL (FT)		COMPL	FIR
SAMPLER	Split Spoon	BORING			
SAMPLER HAMMER		LOCATION			
		ENGINEER GEOLOGIST	Andy Rolinger		

SAMPLES	DEPTH FT.	PENETR. RESIST. BL/6 IN.	REC. IN.	TYPE/ NO.	DESCRIPTION	FIELD MEASUREMENTS	SOIL DESCRIPTION	REMARKS
							TOPOSOIL	
		2 8 9 15	12 24	S-1 (0'-2')	Medium dense, brown, TOPSOIL, little coarse sand, fine gravel, trace silt	ND		
		20 27 24 25	13 24	S-2 (2'-4')	Very dense, brown with white mottling, fine to coarse SAND and fine GRAVEL (fill), trace silt	ND		
	5	14 20 20 15	18 24	S-3 (4'-6')	Dense, brown with white mottling, fine to coarse SAND, fine to medium GRAVEL (fill), trace silt, trace wood fragments	1.5		
		19 17 12 11	6 24	S-4 (6'-8')	Medium dense, brown, fine to coarse SAND and fine to medium GRAVEL (fill), trace silt and wood fragments	2.0		
	10	5 7 17 19	12 24	S-5 (8'-10')	Medium dense, brown, fine to medium SAND and SILT, little coarse sand, and fine gravel, wood fragments	1.2		
		15 9 8 9	18 24	S-6 (10'-12')	Medium dense, brown, fine to medium SAND and SILT	3.4		
		7 9 7 10	12 24	S-7 (12'-14')	Top 6" Medium dense, brown, fine to medium SAND and SILT Bottom 6" Medium dense, gray, fine to coarse SAND and fine GRAVEL (fill), wet	2.3		
	15	17 10 12 12	10 24	S-8 (14'-16')	Medium dense, gray, fine to medium SAND and SILT, little coarse sand, wet	2.0	SAND and SILT	
		11 12 14 20	6 24	S-9 (16'-18')	Medium dense, gray, fine to medium SAND and SILT, little coarse sand Trace black "pebbles" that release naphthalene odor when crushed (coal tar?), wet	3.4		
	20	7 20 12 10	4 24	S-10 (20'-22')	Dense, gray, fine to coarse SAND, fine GRAVEL, and SILT (native river bed), wet	0.9	SAND, SILT and GRAVEL	
					End of exploration at 22'			

25

Remarks

1. Soil screened in field using TE1580B photo ionization detector with 10.2 eV lamp referenced to PPM of Benzene in air. Readings in PPM. "ND" indicates none detected.
2. Well set at 20' PVC screen (20'-10'), PVC riser (10'-ground surface), Bentonite (6'-4'), Sand (20'-6' and 4'-ground surface)

O'REILLY, TALBOT & OKUN ASSOCIATES, INC.
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LOG OF BORING 4W-5

Page 1 OF 1

PROJECT Historic Mill River (Area 4)
 DRILLING CONTRACTOR Seaboard Environmental Drilling
 DRILLING EQUIPMENT B-53

FOREMAN
 Frank

LOCATION Northampton, MA
 DATE STARTED 09/18/2003

PROJECT NO J0285 03 01
 DATE FINISHED 09/18/2003
 GROUND SURFACE ELEV DATUM

TYPE BIT Hollow Stem Auger
 CASING SIZE & TYPE OF CORE BARREL
 CASING HAMM WEIGHT DROP
 SAMPLER Split Spoon WEIGHT DROP
 SAMPLER 140 30"
 HAMMER

No Sample 10
 TIME
 WATER LEVEL (FT.)
 BORING
 LOCATION
 ENGINEER GEOLOGIST

UNDIST
 FIRST COMPL HR
 14'
 off plot behind UPS store
 Rena Chadwick

SAMPLES	DEPTH FT.	PENETR. RESIST. BL/6 IN.	REC. IN.	TYPE/ NO.	DESCRIPTION	SOIL DESCRIPTION	REMARKS
						FILL	
		3.4-4.7	5.24	S-1 (0'-2')	Tan brown, medium SAND, some fine sand (fill)		
		6.12-12.7	8.27	S-2 (2'-4')	Gray, medium to fine SAND, some rock fragments, some coal slag, brick in bottom 1" (fill)		
	5	6.6-7.5	12.24	S-3 (4'-6')	Tan, medium SAND, some fine sand, few coal slag		
		5.4-3.3	8.24	S-4 (6'-8')	Tan, medium SAND, some fine sand, few coal slag		
	10	3.3-4.3	9.24	S-5 (8'-10')	No RECOVERY Rock jam		
		4.6-6.7	12.24	S-6 (10'-12')	Top 5" Brown, medium SAND, some fine sand Bottom 7" Tan, coarse SAND		
		6.6-6.9	15.24	S-7 (12'-14')	Top 10" Tan to light tan, coarse SAND, some medium sand Bottom 5" Gray-tan, medium to fine SAND, some silt		
	15	8.8-9.13	12.24	S-8 (14'-16')	Tan, coarse SAND, some medium sand, bottom wet		
		16.14-12.10	18.24	S-9 (16'-18')	Top 6" Brown, medium to fine SAND, some rusty monies Middle 6" Tan, coarse SAND, rounded pebbles Bottom 6" Brown, medium to fine SAND		
				S-10 (18'-20')	No sample, native material		
	20				End of exploration at 20'		

Remarks

1. Well set at 20' PVC screen (20'-10'), PVC riser (10'-ground surface), Sand (20'-8'), Bentonite (8'-6'), Native cuttings (6'-1.5'), Sand (1.5'-ground surface)

APPENDIX E
GROUNDWATER SAMPLE COLLECTION LOGS

O'REILLY, TALBOT & OKUN ASSOCIATES, INC.
ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

GROUNDWATER SAMPLING RECORD

PROJECT: Historic Mill River **PROJECT NO.:** 285-03-01
CITY/STATE: Northampton, MA
SAMPLING PERSONNEL: Val Watanabe, Rena Chadwick
DATE: 7/15/2003 **WEATHER:** overcast, ~70

SAMPLE DESIGNATION: 2W-9 **SAMPLING SEQUENCE No.** 1
PURGE METHOD: BAILER / PERISTALTIC PUMP / OTHER _____
SAMPLE METHOD: BAILER / PERISTALTIC PUMP / OTHER _____

WELL DATA

MEASURING POINT: Top of PVC Curb box / Protective pipe / Other: _____
Vertical distance from measuring point to ground surface: _____ above / below grade
WELL DIAMETER: 2" **DEPTH TO WATER:** 5.56 **TOTAL DEPTH:** 8.9
STANDING WATER(ft): _____ **ONE VOLUME = (gal):** _____
CONDITION OF WELL: Good unlocked / standing water in annulus / other: _____
RECHARGE RATE: Slow Moderate / Fast _____

WATER DATA

APPEARANCE: Clear / cloudy / silty / sheen / floating product / other: brown, grey
ODOR: None / Petroleum / Other (describe): _____

Time	8:33	8:40	8:51	9:02	9:07	9:12	
Depth to water	5.6	6.5	6.4	6.4	6.4	6.4	
Cum. purge volume	0	0.3 gal	0.7 gal	0.9	1.1 gal	1.5 gal	
pH (S.U.)	6.8	6.5	6.5	6.2	6.6	6.5	
Cond'y (umho/cm)	570	5	762	7.0	1002	1080	
Temp (°C)	16.9	17.1	16.8	16.7	16.7	16.7	
Turbidity							
Dissolved O ₂ (mg/l)							
Other/comments:		slow		slow			

SAMPLE BOTTLES:

ANALYSIS	BOTTLES (number & type)	PRESERVATIVE (type&amount)
VPH (HC ranges only)	3 - 40 ml VOA vials	HCl to pH ≤2
EPH (HC ranges only)	2 - 1 liter amber glass jars	none
VOCs 8260	3 - 40 ml VOA vials	HCl to pH ≤2
SVOCs 8270	2 - 1 liter amber glass jars	none
pesticides	1 - 1 liter amber glass jars	none
cyanide	1 - 250 ml amber glass jar	NaOH to pH ≥ 12
metals (PP-13 + barium)	1 - 250 ml HDPE bottle	HNO ₃ to pH ≤ 2

NOTES AND OBSERVATIONS:

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GROUNDWATER SAMPLING RECORD

PROJECT: Historic Mill River **PROJECT NO.:** 285-03-01
CITY/STATE: Northampton, MA
SAMPLING PERSONNEL: Val Watanabe, Rena Chadwick
DATE: 7/15/2003 **WEATHER:** overcast - 70

SAMPLE DESIGNATION: 2-1-2 **SAMPLING SEQUENCE No.** 2
PURGE METHOD: BAILER / PERISTALTIC PUMP / OTHER
SAMPLE METHOD: BAILER / PERISTALTIC PUMP / OTHER

WELL DATA

MEASURING POINT: Top of PVC / Curb box / Protective pipe / Other: _____
Vertical distance from measuring point to ground surface: 0.7 above / below grade
WELL DIAMETER: 1" **DEPTH TO WATER:** 1.7 **TOTAL DEPTH:** 2.5
STANDING WATER(ft): _____ **ONE VOLUME = (gal):** _____
CONDITION OF WELL: Good / unlocked / standing water in annulus / other: _____
RECHARGE RATE: Slow / Moderate / Fast

WATER DATA

APPEARANCE: Clear / cloudy / silty / sheen / floating product / other: _____
ODOR: None / Petroleum / Other (describe): _____

Time							
Depth to water							
Cum. purge volume							
pH (S.U.)							
Cond'y (umho/cm)							
Temp (°C)							
Turbidity							
Dissolved O ₂ (mg/l)							
Other/comments:							

SAMPLE BOTTLES:

ANALYSIS	BOTTLES (number & type)	PRESERVATIVE (type&amount)
VPH (HC ranges only)	3 - 40 ml VOA vials	HCl to pH ≤ 2
EPH (HC ranges only)	2 - 1 liter amber glass jars	none
VOCs 8260	3 - 40 ml VOA vials	HCl to pH ≤ 2
SVOCs 8270	2 - 1 liter amber glass jars	none
pesticides	1 - 1 liter amber glass jars	none
cyanide	1 - 250 ml amber glass jar	NaOH to pH ≥ 12
metals (PP-13 + barium)	1 - 250 ml HDPE bottle	HNO ₃ to pH ≤ 2

NOTES AND OBSERVATIONS:

2nd well along historic mill river
1 - 250 ml HDPE bottle

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ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

GROUNDWATER SAMPLING RECORD

PROJECT: Historic Mill River **PROJECT NO.:** 285-03-01
CITY/STATE: Northampton, MA
SAMPLING PERSONNEL: Val Watanabe, Rena Chadwick
DATE: 7/15/2003 **WEATHER:** _____

SAMPLE DESIGNATION: 2W-1 **SAMPLING SEQUENCE No.** 3
PURGE METHOD: BAILER / PERISTALTIC PUMP / OTHER
SAMPLE METHOD: BAILER / PERISTALTIC PUMP / OTHER

WELL DATA

MEASURING POINT: Top of: PVC / Curb box / Protective pipe / Other:
Vertical distance from measuring point to ground surface: 1.52 above / below grade
WELL DIAMETER: _____ **DEPTH TO WATER:** 1.52 **TOTAL DEPTH:** 1.52
STANDING WATER(ft): _____ **ONE VOLUME = (gal):** _____
CONDITION OF WELL: Good / unlocked / standing water in annulus / other:
RECHARGE RATE: Slow / Moderate / Fast

WATER DATA

APPEARANCE: Clear / cloudy / silty / sheen / floating product / other:
ODOR: None / Petroleum / Other (describe):

Time							
Depth to water							
Cum. purge volume							
pH (S.U.)							
Cond'y (umho/cm)							
Temp (°C)							
Turbidity							
Dissolved O ₂ (mg/l)							
Other/comments:							

SAMPLE BOTTLES:

ANALYSIS	BOTTLES (number & type)	PRESERVATIVE (type&amount)
VPH (HC ranges only)	3 - 40 ml VOA vials	HCl to pH ≤ 2
EPH (HC ranges only)	2 - 1 liter amber glass jars	none
VOCs 8260	3 - 40 ml VOA vials	HCl to pH ≤ 2
SVOCs 8270	2 - 1 liter amber glass jars	none
pesticides	1 - 1 liter amber glass jars	none
cyanide	1 - 250 ml amber glass jar	NaOH to pH ≥ 12
metals (PP-13 + barium)	1 - 250 ml HDPE bottle	HNO ₃ to pH ≤ 2

NOTES AND OBSERVATIONS:

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ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

GROUNDWATER SAMPLING RECORD

PROJECT: Historic Mill River **PROJECT NO.:** 285-03-01
CITY/STATE: Northampton, MA
SAMPLING PERSONNEL: ~~Val Watanabe~~, Rena Chadwick
DATE: 7/15/2003 **WEATHER:** cloudy
SAMPLE DESIGNATION: 4W-1 **SAMPLING SEQUENCE No.** 1
PURGE METHOD: BAILER / PERISTALTIC PUMP / OTHER
SAMPLE METHOD: BAILER / PERISTALTIC PUMP / OTHER

WELL DATA

MEASURING POINT: Top of PVC Curb box / Protective pipe / Other: _____
Vertical distance from measuring point to ground surface: _____ above / below grade
WELL DIAMETER: 2" **DEPTH TO WATER:** 13.5 **TOTAL DEPTH:** 15.7
STANDING WATER(ft): _____ **ONE VOLUME = (gal):** _____
CONDITION OF WELL: Good / unlocked / standing water in annulus / other: _____
RECHARGE RATE: Slow / Moderate / Fast _____

WATER DATA

APPEARANCE: Clear / cloudy / silty / sheen / floating product / other: _____
ODOR: None / Petroleum / Other (describe): _____

Time	12:35	12:41	12:46	12:48			
Depth to water	14.71	14.93	14.50	14.58			
Cum. purge volume	0	0.1	0.7	1.0			
pH (S.U.)	6.7	7.0	7.5	7.2			
Cond'y (mmho/cm)	230	23	2.5	2.1			
Temp (°C)	14.2	16.3	15.8	15.6			
Turbidity							
Dissolved O ₂ (mg/l)							
Other/comments:							

SAMPLE BOTTLES:

ANALYSIS	BOTTLES (number & type)	PRESERVATIVE (type&amount)
VPH (HC ranges only)	3 - 40 ml VOA vials	HCl to pH ≤2
EPH (HC ranges only)	2 - 1 liter amber glass jars	none
VOCs 8260	3 - 40 ml VOA vials	HCl to pH ≤2
SVOCs 8270	2 - 1 liter amber glass jars	none
pesticides	1 - 1 liter amber glass jars	none
cyanide	1 - 250 ml amber glass jar	NaOH to pH ≥ 12
metals (PP-13 + barium)	1 - 250 ml HDPE bottle	HNO ₃ to pH ≤ 2

NOTES AND OBSERVATIONS:

O'REILLY, TALBOT & OKUN ASSOCIATES, INC.
ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

GROUNDWATER SAMPLING RECORD

PROJECT: Historic Mill River **PROJECT NO.:** 285-03-01
CITY/STATE: Northampton, MA
SAMPLING PERSONNEL: John Chiodini & Rob Del
DATE: 8/12/03 **WEATHER:** cloudy + rain

SAMPLE DESIGNATION: 4W-1 (K25) **SAMPLING SEQUENCE No.** 1
PURGE METHOD: BAILER / PERISTALTIC PUMP / OTHER
SAMPLE METHOD: BAILER / PERISTALTIC PUMP / OTHER

WELL DATA

MEASURING POINT: Top of: PVC Curb box / Protective pipe / Other: _____
Vertical distance from measuring point to ground surface: 1.5' above below grade
WELL DIAMETER: 2 **DEPTH TO WATER:** 12.72 **TOTAL DEPTH:** 13
STANDING WATER(ft): _____ **ONE VOLUME = (gal):** _____
CONDITION OF WELL: Good unlocked standing water in annulus / other: _____
RECHARGE RATE: Slow / Moderate / Fast

WATER DATA

APPEARANCE: Clear / cloudy / silty / sheen / floating product / other: _____
ODOR: None / Petroleum / Other (describe): _____

Time	<u>9:15</u>						
Depth to water							
Cum. purge volume							
pH (S.U.)	<u>6.2</u>						
Cond'y (umho/cm)							
Temp (°C)							
Turbidity							
Dissolved O ₂ (mg/l)							
Other/comments:							

SAMPLE BOTTLES:

ANALYSIS	BOTTLES (number & type)	PRESERVATIVE (type&amount)
VPH (HC ranges only)	3 - 40 ml VOA vials	HCl to pH ≤ 2
EPH (HC ranges only)	2 - 1 liter amber glass jars	none
VOCs 8260	3 - 40 ml VOA vials	HCl to pH ≤ 2
SVOCs 8270	2 - 1 liter amber glass jars	none
pesticides	1 - 1 liter amber glass jars	none
cyanide	1 - 250 ml amber glass jar	NaOH to pH ≥ 12
metals (PP-13 + barium)	1 - 250 ml HDPE bottle	HNO ₃ to pH ≤ 2

NOTES AND OBSERVATIONS:

O'REILLY, TALBOT & OKUN ASSOCIATES, INC.
ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

GROUNDWATER SAMPLING RECORD

PROJECT: Mill River PROJECT NO.: 285-03-01
 CITY/STATE: Northampton, MA
 SAMPLING PERSONNEL: W. J. & K. J.
 DATE: 8/12/03 WEATHER: Cloudy / humid

SAMPLE DESIGNATION: ZTZ SAMPLING SEQUENCE No. 2
 PURGE METHOD: BAILER / PERISTALTIC PUMP / OTHER
 SAMPLE METHOD: BAILER / PERISTALTIC PUMP / OTHER

WELL DATA

MEASURING POINT: Top of: (PVC) Curb box / Protective pipe / Other:
 Vertical distance from measuring point to ground surface: 2.65 (above) (below) grade
 WELL DIAMETER: 1 in DEPTH TO WATER: 7.05 TOTAL DEPTH: 13.6
 STANDING WATER(ft): 6.15 ONE VOLUME = (gal):
 CONDITION OF WELL: Good / unlocked / standing water in annulus / other: unlocked
 RECHARGE RATE: Slow / Moderate / Fast

WATER DATA

APPEARANCE: Clear / cloudy / silty / sheen / floating product / other: initially cloudy but cleared up
 ODOR: None / Petroleum / Other (describe):

Time	10:30	10:45	11:00				
Depth to water		MI C	120				
Cum. purge volume	1/4 gal	1/2 gal	1 gal				
pH (S.U.)	6.4	7.0	7.75				
Cond'y (umho/cm)	765	770	850				
Temp (°C)	19.6	19.8	18.8				
Turbidity							
Dissolved O ₂ (mg/l)							
Other/comments:							

SAMPLE BOTTLES:

ANALYSIS	BOTTLES (number & type)	PRESERVATIVE (type & amount)
VPH (HC) + VOC	3 VOA'S (each)	HC
EPH (HC)	2 1-L Amber	HC
SVOC + pesticide	2 1-L Amber (each)	
C/amide	1 250 mL plastic	NaOH
Metals Pre-13	1 250 mL plastic	HNO ₃ (unfiltered)

NOTES AND OBSERVATIONS:

O'REILLY, TALBOT & OKUN ASSOCIATES, INC.
ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

GROUNDWATER SAMPLING RECORD

PROJECT: Historic Mill River **PROJECT NO.:** 285-03-01
CITY/STATE: Northampton, MA
SAMPLING PERSONNEL: Rena Chodwick & Rob DeLong
DATE: 8/12/03 **WEATHER:** Cloudy + humid 85°

SAMPLE DESIGNATION: JT3 **SAMPLING SEQUENCE No.** 3
PURGE METHOD: BAILER / PERISTALTIC PUMP / OTHER
SAMPLE METHOD: BAILER / PERISTALTIC PUMP / OTHER

WELL DATA

MEASURING POINT: Top of PVC / Curb box / Protective pipe / Other: 3.6
Vertical distance from measuring point to ground surface: 2' 5 1/2" above / below grade
WELL DIAMETER: 1" **DEPTH TO WATER:** 6.7' **TOTAL DEPTH:** 10.6'
STANDING WATER(ft): 6.7' **ONE VOLUME = (gal):**
CONDITION OF WELL: Good / unlocked / standing water in annulus / other: good
RECHARGE RATE: Slow / Moderate / Fast

WATER DATA

APPEARANCE: Clear / cloudy / silty / sheen / floating product / other: cloudy initially, cleared up
ODOR: None / Petroleum / Other (describe):

Time	<u>1135</u>	<u>1145</u>	<u>1150</u>				
Depth to water							
Cum. purge volume							
pH (S.U.)	<u>6.5</u>	<u>6.4</u>	<u>5.5</u>				
Cond'y (umho/cm)	<u>665</u>	<u>665</u>	<u>665</u>				
Temp (°C)	<u>19.7</u>	<u>19.8</u>	<u>19.8</u>				
Turbidity							
Dissolved O ₂ (mg/l)							
Other/comments:							

SAMPLE BOTTLES:

ANALYSIS	BOTTLES (number & type)	PRESERVATIVE (type&amount)
✓ VPH (HC ranges only)	3 - 40 ml VOA vials	HCl to pH ≤ 2
✓ EPH (HC ranges only)	2 - 1 liter amber glass jars	none
✓ VOCs 8260	3 - 40 ml VOA vials	HCl to pH ≤ 2
✓ SVOCs 8270	2 - 1 liter amber glass jars	none
✓ pesticides	<u>2</u> - 1 liter amber glass jars	none
✓ cyanide	1 - 250 ml <u>plastic</u> amber glass jar	NaOH to pH ≥ 12
metals (PP-13 - barium)	1 - 250 ml HDPE bottle	HNO ₃ to pH ≤ 2

metals (filtered) Phony 1 - 250ml HDPE bottle HNO₃

NOTES AND OBSERVATIONS:

Standing water to ground surface

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ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

GROUNDWATER SAMPLING RECORD

PROJECT: Historic Mill River **PROJECT NO.:** 285-03-01
CITY/STATE: Northampton, MA
SAMPLING PERSONNEL: Rene Chodwick & Reb DeLong
DATE: 8/12/03 **WEATHER:** _____

SAMPLE DESIGNATION: 2T1 **SAMPLING SEQUENCE No.** 4
PURGE METHOD: BAILER / PERISTALTIC PUMP / OTHER _____
SAMPLE METHOD: BAILER / PERISTALTIC PUMP / OTHER _____

WELL DATA

MEASURING POINT: Top of PVC / Curb box / Protective pipe / Other: ~1' water
Vertical distance from measuring point to ground surface: 1.60 above / below grade
WELL DIAMETER: 1" **DEPTH TO WATER:** 15.15 **TOTAL DEPTH:** 16.5
STANDING WATER(ft): ~1" **ONE VOLUME = (gal):** _____
CONDITION OF WELL: Good / unlocked / standing water in annulus / other: _____
RECHARGE RATE: Slow / Moderate / Fast _____

WATER DATA

APPEARANCE: Clear / cloudy / silty / sheen / floating product / other: couldn't get any out
ODOR: None / Petroleum / Other (describe): IA

Time	<u>1:15</u>						
Depth to water							
Cum. purge volume							
pH (S.U.)	<u>no data</u>						
Cond'y (umho/cm)	<u>no data</u>						
Temp (°C)							
Turbidity							
Dissolved O ₂ (mg/l)							
Other/comments:							

SAMPLE BOTTLES:

ANALYSIS	BOTTLES (number & type)	PRESERVATIVE (type&amount)
VPH (HC ranges only)	3 - 40 ml VOA vials	HCl to pH ≤ 2
EPH (HC ranges only)	2 - 1 liter amber glass jars	none
VOCs 8260	3 - 40 ml VOA vials	HCl to pH ≤ 2
SVOCs 8270	2 - 1 liter amber glass jars	none
pesticides	1 - 1 liter amber glass jars	none
cyanide	1 - 250 ml amber glass jar	NaOH to pH ≥ 12
metals (PP-13 + barium)	1 - 250 ml HDPE bottle	HNO ₃ to pH ≤ 2

metals (filtered) Phony 1- 250ml HDPE bottle HNO₃

NOTES AND OBSERVATIONS:

couldn't get pump to draw water out

O'REILLY, TALBOT & OKUN ASSOCIATES, INC.
ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

GROUNDWATER SAMPLING RECORD

PROJECT: Mill River PROJECT NO.: 285-03-01

CITY/STATE: Noho

SAMPLING PERSONNEL: RC + RD

DATE: 2/2/03 WEATHER: sunny + humid, 80°

SAMPLE DESIGNATION: 12W-9 SAMPLING SEQUENCE No. 5

PURGE METHOD: BAILER / PERISTALTIC PUMP / OTHER

SAMPLE METHOD: BAILER / PERISTALTIC PUMP / OTHER

WELL DATA

MEASURING POINT: Top of PVC Curb box / Protective pipe / Other: cell

Vertical distance from measuring point to ground surface: 2.2 above / below grade

WELL DIAMETER: 2" DEPTH TO WATER: 4.6 TOTAL DEPTH: 8.3

STANDING WATER(ft): ~4ft ONE VOLUME = (gal):

CONDITION OF WELL: Good / Unlocked / standing water in annulus / other: locked

RECHARGE RATE: Slow / Moderate / Fast

WATER DATA

APPEARANCE: Clear / cloudy / silty / sheen / floating product / other: heavy silt

ODOR: None / Petroleum / Other (describe):

Time	<u>2pm</u>						
Depth to water							
Cum. purge volume							
pH (S.U.)	<u>6.4</u>						
Cond'y (umho/cm)	<u>675</u>						
Temp (°C)	<u>20.3</u>						
Turbidity	<u>1.2 NTU</u>						
Dissolved O ₂ (mg/l)							
Other/comments							

SAMPLE BOTTLES:

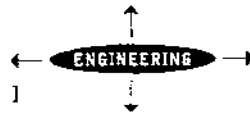
ANALYSIS	BOTTLES (number & type)	PRESERVATIVE (type&amount)
<u>PD</u>	<u>1-250ml plastic</u>	<u>HNO₃</u>

NOTES AND OBSERVATIONS:

collected filtered + unfiltered

Environmental Safety Health Geotechnical

O'Reilly, Talbot & Okun
[ASSOCIATES]



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GROUNDWATER OR SURFACE WATER SAMPLING RECORD

PROJECT: Mill River PROJECT NO: _____
LOCATION: NCHC
SAMPLING PERSONNEL: VW-RC WEATHER: Sunny, 60's
DATE: 9/30/03 STARTING TIME: 845 FINISHING TIME: _____
SAMPLE DESIGNATION: IH-5 SAMPLING SEQUENCE NO: 1

SAMPLE LOCATION MAP (SKETCH):

Sketch description:
A sketch showing a 'street' and 'woods'. A point labeled 'IH-5' is marked with a circle and 'X', and another point labeled 'IH-1' is marked with a circle. A line connects them, with a note '(~30' from IH-1)'. A 'ballpoint' is also indicated.

Very wet in woods due to recent rain. Location of IH-1 is in standing water.

SOURCE: GROUNDWATER ☒ SURFACE WATER ☐ OTHER ☐
SAMPLING METHOD: GRAB ☐ BAILER ☒ OTHER (describe) low flow

WELL DATA

MEASURING POINT: (Top of PVC/Curb Box...ect): 1' above ground
WELL DIAMETER: 1" DEPTH OF WATER: 1.57 WELL DEPTH: 2.20
STANDING WATER: 0.6' VOLUME OF WATER PURGED: 1 gal
CONDITION OF WELL: new hand driven
COMMENTS: 1" in shovel hole

WATER DATA

pH: 6.07 5.74 5.21
CON: 550 535
DO: 4.52 mg/L
APPEARANCE: clear, slightly brown
ODOR: none
TEMP: 13 13.0 PH: 14 SPECIFIC CONDUCTANCE: _____
TEMPERATURE: _____ SAMPLE DEPTH: _____

ANALYSIS	BOTTLE (S)	PRESERVATIVE
(filtered) lead, mercury (dissolved)	1-500 mL poly	HNO ₃
(unfiltered) lead, mercury (total)	"	"

NOTES AND OBSERVATIONS:

Manually installed 9/30/03 in shallow hole w/ shovel. Recharge OK - no water down at one point, waited for recovery.

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GROUNDWATER SAMPLING RECORD

PROJECT: Mill River PROJECT NO.: 275-03.01
CITY/STATE: Nobis MA
SAMPLING PERSONNEL: W + PC
DATE: 9/30/03 WEATHER: Sunny 60's
SAMPLE DESIGNATION: P-30 2W-16 removed from project D.W. SAMPLING SEQUENCE No. 2
PURGE METHOD: BAILER / PERISTALTIC PUMP / OTHER
SAMPLE METHOD: BAILER / PERISTALTIC PUMP / OTHER

WELL DATA

MEASURING POINT: Top of: PVC Curb box / Protective pipe / Other:
Vertical distance from measuring point to ground surface: 0.4' above / below grade
WELL DIAMETER: 2" DEPTH TO WATER: 4.15' TOTAL DEPTH: 11.50'
STANDING WATER(ft): 7.3 ONE VOLUME = (gal):
CONDITION OF WELL: Good / unlocked / standing water in annulus / other: Brand new
RECHARGE RATE: Slow / Moderate / Fast

WATER DATA

APPEARANCE: Clear / cloudy / silty / sheen / floating product / other:
ODOR: None / Petroleum / Other (describe):

Time	930	935	940	945	950	955	1000
Depth to water	4.15	4.21	4.24	4.20	4.21	4.23	4.22
Cum purge volume	1L	1.5	2L	1.5	1.25 gal	1.5 gal	1.75 gal
pH (S.U.)	6.15	6.85	9.31	6.91	8.71	8.69	8.69
Cond'y (umho/cm)	671 μ S	627	666	834	853	808	910
Temp (°C)	16.6	16.8	17.0	16.8	16.9	17.0	17.1
Turbidity	458	390	81.9	52.6	39.7	28	23
Dissolved O ₂ (mg/l)	2.82	2.77	1.96	1.66	1.75	1.15	1.53
Other/comments:							

SAMPLE BOTTLES:

ANALYSIS	BOTTLES (number & type)	PRESERVATIVE (type & amount)
<u>Lead</u>	<u>500 mL plastic</u>	<u>HNO₃</u>
<u>Mercury</u>		

NOTES AND OBSERVATIONS:

1st split when Spideum + Amce

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GROUNDWATER SAMPLING RECORD

PROJECT: Mill River PROJECT NO.: 282-03-01
 CITY/STATE: Southampton MA
 SAMPLING PERSONNEL: RC
 DATE: 9/2/03 WEATHER: unny 60°

SAMPLE DESIGNATION: 3W-2 SAMPLING SEQUENCE No. 3
 PURGE METHOD: BAILER / PERISTALTIC PUMP / OTHER _____
 SAMPLE METHOD: BAILER / PERISTALTIC PUMP / OTHER _____

WELL DATA

MEASURING POINT: Top of PVC / Curb box / Protective pipe / Other: _____
 Vertical distance from measuring point to ground surface: 2.50' (above) (below) grade
 WELL DIAMETER: 2 DEPTH TO WATER: 11.40' TOTAL DEPTH: 14.39'
 STANDING WATER(ft): 2' ONE VOLUME = (gal): _____
 CONDITION OF WELL: Good / unlocked / standing water in annulus / other: none
 RECHARGE RATE: Slow / Moderate / Fast _____

WATER DATA

APPEARANCE: Clear / cloudy / silty / sheen / floating product / other: sheen developed in bucket, gelatinous
 ODOR: None / Petroleum / Other (describe): slight coal tar slight

Time	1100	1106	1110	1115	1120		
Depth to water	11.40	11.41	11.41	11.42	11.42		
Cum. purge volume	—	1L	1.5L	2L	2.5	A	
pH (S.U.)	7.66	7.26	7.30	7.29	7.40	A	
Cond'y (umho/cm)	654	1040	1371	1373	1304	A	
Temp (°C)	19.3	18.9	18.8	18.7	18.9	F	
Turbidity	653	653	653			7	
Dissolved O ₂ (mg/l)	1.76	0.61	0.43	0.58	0.78	L	
Other/comments:						E	

too turbid to read

SAMPLE BOTTLES:

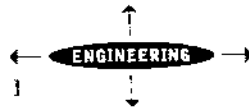
ANALYSIS	BOTTLES (number & type)	PRESERVATIVE (type&amount)
VPH	2 VOCs	HCl
EDH	2 1-L amber	HCl
Cond2	1 250 ml plastic	NaOH
Metals - Fe	1 250 ml plastic	HCl

NOTES AND OBSERVATIONS:

Environmental Safety Health Geotechnical

O'Reilly, Talbot & Okun

[A S S O C I A T E S]



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GROUNDWATER OR SURFACE WATER SAMPLING RECORD

PROJECT: Mill River PROJECT NO: _____
 LOCATION: Near Mill
 SAMPLING PERSONNEL: RC WEATHER: Sunny 60's
 DATE: 9/28/03 STARTING TIME: _____ FINISHING TIME: _____
 SAMPLE DESIGNATION: 300-1 SAMPLING SEQUENCE NO: 4

SAMPLE LOCATION MAP (SKETCH):

SOURCE: GROUNDWATER ☒ SURFACE WATER _____ OTHER _____
 SAMPLING METHOD: GRAB _____ BAILER ☒ OTHER (describe) Pump

WELL DATA

MEASURING POINT: (Top of PVC/Curb Box...ect): 6.35' below gs
 WELL DIAMETER: _____ DEPTH OF WATER 15.26' WELL DEPTH: 17.70'
 STANDING WATER: 1.5' VOLUME OF WATER PURGED: _____
 CONDITION OF WELL: New
 COMMENTS: _____

WATER DATA

APPEARANCE: clear
 ODOR: slight naphthalene
 PH: _____ SPECIFIC CONDUCTANCE: _____
 TEMPERATURE: 56 SAMPLE DEPTH: _____

ANALYSIS	BOTTLE(S)	PRESERVATIVE
6 UPH	2 JARS	HCl
2 -	2 16 Amber	HCl
Cyanide	1 250 ml plastic	H ₂ O ₂
Metals + D.D.T.	1 500ml plastic	H ₂ O ₂

NOTES AND OBSERVATIONS:

* D.T. sample of 1st phase sample

Readings on rise

3W-1 ^{GW} Sample log 9/30/03
back of form

Time	1205	1210	1215	1220
Cand	1001 u/s	901	949	S
pH	6.96	6.92	7.19	A
Temp	17.4	17.9	18.1	M
DO	1.30	1.37	1.41	P
Turb	6r3	→		L E

readings
pretty
consistent
+ well volume
small. Air
bubbles in
tubing

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GROUNDWATER SAMPLING RECORD

PROJECT: Mill River PROJECT NO.: 22-03-01
CITY/STATE: New Hampton MI
SAMPLING PERSONNEL: RC
DATE: 9/30/03 WEATHER: Sunny 60°

SAMPLE DESIGNATION: 40-5 SAMPLING SEQUENCE No. 5
PURGE METHOD: BAILER / PERISTALTIC PUMP / OTHER
SAMPLE METHOD: BAILER / PERISTALTIC PUMP / OTHER

WELL DATA

MEASURING POINT: Top of PVC / Curb box / Protective pipe / Other: 42
Vertical distance from measuring point to ground surface: 4.5' above / below grade
WELL DIAMETER: 2" DEPTH TO WATER: 13.47 TOTAL DEPTH: 19.00
STANDING WATER(ft): ONE VOLUME = (gal):
CONDITION OF WELL: Good / unlocked / standing water in annulus / other: drill new
RECHARGE RATE: Slow / Moderate / Fast

WATER DATA

APPEARANCE: Clear / cloudy / silty / sheen / floating product / other:
ODOR: None / Petroleum / Other (describe):

Time	240	245	250	255			
Depth to water	13.47	13.47	13.48	13.50			
Cum. purge volume	1/4 gal	1/2 gal	3/4 gal	1 gal			
pH (S.U.)	6.62	6.38	6.29	6.24			
Cond'y (umho/cm)	515	555	500	503			
Temp (°C)	17.4	17.6	18.1	18.6			
Turbidity	17	14	4.6	3.6			
Dissolved O ₂ (mg/l)	4.48	4.23	4.26	4.0			
Other/comments:							

SAMPLE BOTTLES:

ANALYSIS	BOTTLES (number & type)	PRESERVATIVE (type & amount)
VPH	2 VCAPS	HCl
EPH	3 1L amber	HCl
Cyanide	1 250 mL plastic	NaOH
Metals B-	1 500 mL plastic	HNO ₃

NOTES AND OBSERVATIONS:

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GROUNDWATER SAMPLING RECORD

PROJECT: Historic Mill River **PROJECT NO.:** 285-03-01
CITY/STATE: Northampton, MA
SAMPLING PERSONNEL: Val Watanabe
DATE: 10/16/2003 **WEATHER:** sunny, 50's

SAMPLE DESIGNATION: 2W-9 **SAMPLING SEQUENCE No.** 1
PURGE METHOD: BAILER / PERISTALTIC PUMP / OTHER
SAMPLE METHOD: BAILER / PERISTALTIC PUMP / OTHER

WELL DATA

MEASURING POINT: Top of: PVC / Curb box / Protective pipe / Other: _____
Vertical distance from measuring point to ground surface: _____ above / below grade
WELL DIAMETER: 2" **DEPTH TO WATER:** _____ **TOTAL DEPTH:** _____
STANDING WATER(ft): _____ **ONE VOLUME = (gal):** _____
CONDITION OF WELL: Good / unlocked / standing water in annulus / other: _____
RECHARGE RATE: Slow / Moderate / Fast _____

WATER DATA

APPEARANCE: clear / cloudy / silty / sheen / floating product / other: sl. brown
ODOR: None / Petroleum / Other (describe): _____

Time	1205	1208	1211	1218	1220	1222	1225
Depth to water							
Cum. purge volume	0.1						
pH (S.U.) #2	13.3	13.0	12.8	12.8	12.7	12.7	12.7
Cond'y (umho/cm)	320	407	343	634	337	314	342
Temp (°C)	13	13	13	13	13	13	13
Turbidity							
Dissolved O ₂ (mg/l)							
Other/comments:	slowed pump, slowed pump, lifted tube						

SAMPLE BOTTLES:

ANALYSIS	BOTTLES (number & type)	PRESERVATIVE (type & amount)
cyanide	1 - 250 ml HDPE bottle	NaOH to pH > 12
metals (PP-13 + barium)	1 - 250 ml HDPE bottle	HNO ₃ to pH < 2
total org. and tetraEt lead	1 - 500 ml HDPE bottle	none
SVOCS 8270	2 - 1 liter amber glass jars	none
Hekii Pb + Hg (splits for spec.)	1 @ 500 ml HDPE	HNO ₃

NOTES AND OBSERVATIONS:

final sample = brown silty appearance even though v. slow, purging
only sporadic "clear" appearance

DID NOT
SUBMIT
TO LAB

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GROUNDWATER SAMPLING RECORD

PROJECT: Mill River PROJECT NO.: 285-03-01
CITY/STATE: Noho MA
SAMPLING PERSONNEL: RC
DATE: 10/21/03 WEATHER: Overcast, T-storm ⚡

SAMPLE DESIGNATION: 2W-9 SAMPLING SEQUENCE No. 1
PURGE METHOD: BAILER / PERISTALTIC PUMP / OTHER
SAMPLE METHOD: BAILER / PERISTALTIC PUMP / OTHER

WELL DATA

MEASURING POINT: Top of PVC / Curb box / Protective pipe / Other: Standpipe
Vertical distance from measuring point to ground surface: above / below grade
WELL DIAMETER: 2 DEPTH TO WATER: 5.57 TOTAL DEPTH: 10.63
STANDING WATER(ft): 2.5 ONE VOLUME = (gal):
CONDITION OF WELL: Good / unlocked / standing water in annulus / other: locked
RECHARGE RATE: Slow / Moderate / Fast

WATER DATA

APPEARANCE: Clear / cloudy / silty / green / floating product / other: silty
ODOR: None / Petroleum / Other (describe):

Time	930	935	940	945	950		
Depth to water	5.57	5.58	5.58	5.58	5.58		
Cum. purge volume	1L	2L	3L	3.5L	4L		
pH (S.U.)	7.42	6.82	6.81	6.80	6.81		
Cond'y (umho/cm)	680 uS	717	772	772	770		
Temp (°C)	14.4	14.5	14.6	14.6	14.7		
Turbidity	—	—	—	—	—		
Dissolved O ₂ (mg/l)	1.91	0.53	1.37	0.73	0.57		
Other/comments:				tuned ↓			

SAMPLE BOTTLES:

ANALYSIS	BOTTLES (number & type)	PRESERVATIVE (type & amount)
Total Pb+Hg	1- 500mL	HNO ₃
Total org Pb (Gen)	↓	none
Total Pb+Hg		HNO ₃

Spectrum
- AMRO

NOTES AND OBSERVATIONS:

Bailer was in HD when well was opened.

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GROUNDWATER SAMPLING RECORD

PROJECT: Mill River PROJECT NO.: _____
CITY/STATE: Noho MA
SAMPLING PERSONNEL: RC
DATE: 10/21/03 WEATHER: Overcast (r-storm passing) ⚡
SAMPLE DESIGNATION: 3W-1 SAMPLING SEQUENCE No. 2
PURGE METHOD: BAILER / PERISTALTIC PUMP / OTHER _____
SAMPLE METHOD: BAILER / PERISTALTIC PUMP / OTHER _____

WELL DATA

MEASURING POINT: Top of: PVC / Curb box / Protective pipe / Other: _____
Vertical distance from measuring point to ground surface: _____ above / below grade
WELL DIAMETER: 2 DEPTH TO WATER: 15.49 TOTAL DEPTH: 17.62
STANDING WATER(ft): 2 ONE VOLUME = (gal): _____
CONDITION OF WELL: Good / unlocked / standing water in annulus / other: _____
RECHARGE RATE: Slow / Moderate / Fast shallow standing H₂O, don't recharge

WATER DATA

APPEARANCE: Clear / cloudy / silty / sheen / floating product / other: _____
ODOR: None / Petroleum / Other (describe): Naphthalene (mothballs)

Time	1045	1050	1055	1101	1105	1110	
Depth to water	15.49	15.50	15.50	15.60	15.60	15.66	S
Cum. purge volume	—	1L	1.5L	2L	2.5	3L	
pH (S.U.)	7.18	7.16	7.10	7.16 °	7.16 °	7.23	A
Cond'y (umho/cm)	876 °	851	819	820 °	821 °	823	M
Temp (°C)	15.1	15.7	15.8	15.9 °	15.9 °	15.9	P
Turbidity	—	—	—	—	—	—	P
Dissolved O ₂ (mg/l)	3.11	1.14	1.07	0.5 -	0.64	0.76	L
Other/comments:			turned ↓	turned ↓			E

SAMPLE BOTTLES:

ANALYSIS	BOTTLES (number & type)	PRESERVATIVE (type&amount)
<u>Total & PA</u>		
<u>Cyanide</u>	<u>2 - 500mL</u>	<u>NaOH</u>

NOTES AND OBSERVATIONS:

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ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

GROUNDWATER SAMPLING RECORD

PROJECT: Mill River PROJECT NO.: _____

CITY/STATE: Nano

SAMPLING PERSONNEL: RC

DATE: 10/21/03 WEATHER: OK... mostly sunny (no clouds)

SAMPLE DESIGNATION: 310-2 SAMPLING SEQUENCE No. 3

PURGE METHOD: BAILER / PERISTALTIC PUMP / OTHER

SAMPLE METHOD: BAILER / PERISTALTIC PUMP / OTHER

WELL DATA

MEASURING POINT: Top of PVC / Curb box / Protective pipe / Other:

Vertical distance from measuring point to ground surface: _____ above / below grade

WELL DIAMETER: 2 DEPTH TO WATER: 11.58 TOTAL DEPTH: 19.3

STANDING WATER(ft): _____ ONE VOLUME = (gal): _____

CONDITION OF WELL: Good / Unlocked / standing water in annulus / other:

RECHARGE RATE: Slow / Moderate / Fast

WATER DATA

APPEARANCE: Clear / cloudy / silty / sheen / floating product / other:

ODOR: None / Petroleum / Other (describe): Naphthalene / Marshy

Time	1130	1135	1140	1145	1150	1155	12--	1205
Depth to water	11.58	11.60	11.60	11.60	11.60	11.60	11.60	11.61
Cum. purge volume	—	—	—	—	—	—	—	—
pH (S.U.)	6.99	6.84	6.88	6.85	6.87	6.89	6.86	6.90
Cond'y (umho/cm)	903	926	943	960	973	978	974	976
Temp (°C)	16.6	16.7	16.7	16.7	16.9	16.8	16.8	16.8
Turbidity	—	—	—	—	—	—	—	—
Dissolved O ₂ (mg/l)	1.10	0.25	0.20	0.17	0.32	0.47	0.50	0.40
Other/comments:								

SAMPLE BOTTLES:

ANALYSIS	BOTTLES (number & type)	PRESERVATIVE (type&amount)
Total Pb	1- 500 mL plastic	HNO ₃
Total org lead, TC	1- 500 mL plastic	—
Total + IKA Grande	2- 500 mL plastic	NaOH
Total Pb	1- 500 mL plastic	HNO ₃

Lab dips to Ampro + Spectrom

NOTES AND OBSERVATIONS:

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GROUNDWATER SAMPLING RECORD

PROJECT: Mill River PROJECT NO.: 285-03-01
CITY/STATE: Noho MA
SAMPLING PERSONNEL: RC
DATE: 10/21/03 WEATHER: PC

SAMPLE DESIGNATION: 4W-5 SAMPLING SEQUENCE No. 4
PURGE METHOD: BAILER / PERISTALTIC PUMP / OTHER
SAMPLE METHOD: BAILER / PERISTALTIC PUMP / OTHER

WELL DATA

MEASURING POINT: Top of: PVC / Curb box / Protective pipe / Other: edge of box (car parked over)
Vertical distance from measuring point to ground surface: _____ above / below grade
WELL DIAMETER: 2 DEPTH TO WATER: 13.7 TOTAL DEPTH: 20.1
STANDING WATER(ft): _____ ONE VOLUME = (gal): _____
CONDITION OF WELL: Good / unmasked / standing water in annulus / other: _____
RECHARGE RATE: Slow / Moderate / Fast

WATER DATA

APPEARANCE: Clear / cloudy / silty / sheen / floating product / other: _____
ODOR: None / Petroleum / Other (describe): _____

Time	210	215	220	225	230		
Depth to water	13.7	13.7	13.7	13.7	13.7		
Cum. purge volume	—	—	—	—	—		
pH (S.U.)	7.15	6.69	6.67	6.68	6.70		
Cond'y (umho/cm)	520	522	523	521	519		
Temp (°C)	17.3	17.4	17.3	17.3	17.3		
Turbidity	—	—	—	—	—		
Dissolved O ₂ (mg/l)	6.09	4.12	4.17	4.24	4.23		
Other/comments:							

SAMPLE BOTTLES:

ANALYSIS	BOTTLES (number & type)	PRESERVATIVE (type&amount)
Total Pb	1-500 mL	HNO ₃
Total org Pb (GEL)	—	—
Total + PA Granule	—	NaOH

NOTES AND OBSERVATIONS:

Car parked over. Leak from oil pan to well cover. Oil did not appear to be in well.

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GROUNDWATER SAMPLING RECORD

PROJECT: Mill River PROJECT NO.: _____

CITY/STATE: Noho _____

SAMPLING PERSONNEL: PC _____

DATE: 10/21/83 WEATHER: PC _____

SAMPLE DESIGNATION: 4W6 SAMPLING SEQUENCE No. 5

PURGE METHOD: BAILER / PERISTALTIC PUMP / OTHER _____

SAMPLE METHOD: BAILER / PERISTALTIC PUMP / OTHER _____

WELL DATA

MEASURING POINT: Top of: PVC Curb box / Protective pipe / Other: hand driven well pt

Vertical distance from measuring point to ground surface: ~1' above / below grade

WELL DIAMETER: 1" DEPTH TO WATER: 1.15 TOTAL DEPTH: 2.12

STANDING WATER(ft): _____ ONE VOLUME = (gal): _____

CONDITION OF WELL: Good / unlocked / standing water in annulus / other: no lock, but cap

RECHARGE RATE: Slow / Moderate / Fast _____

WATER DATA

APPEARANCE: Clear / cloudy / silty / sheen / floating product / other: _____

ODOR: None / Petroleum / Other (describe): area smelled of Naphthalene - couldn't determine if Naphth

Smell was also in well

Time	<u>3--</u>	<u>305</u>	<u>310</u>	<u>313</u>			
Depth to water	<u>1.15</u>	<u>1.15</u>	<u>1.16</u>	<u>1.16</u>			
Cum. purge volume	<u>—</u>	<u>12</u>	<u>21</u>	<u>A</u>			
pH (S.U.)	<u>7.02</u>	<u>6.98</u>	<u>6.97</u>	<u>A</u>			
Cond'y (umho/cm)	<u>111145</u>	<u>1110</u>	<u>1113</u>	<u>M</u>			
Temp (°C)	<u>12.7</u>	<u>12.8</u>	<u>12.0</u>	<u>X</u>			
Turbidity	<u>—</u>	<u>—</u>	<u>—</u>	<u>X</u>			
Dissolved O ₂ (mg/l)	<u>2.62</u>	<u>1.93</u>	<u>1.70</u>	<u>L</u>			
Other/comments:				<u>E</u>			

SAMPLE BOTTLES:

ANALYSIS	BOTTLES (number & type)	PRESERVATIVE (type&amount)
<u>Total Pb</u>	<u>1-500mL plastic</u>	<u>HNO₃</u>
<u>Total Org Pb, TEL</u>	<u>"</u>	<u>"</u>
<u>Total + PA^o Cyanide</u>	<u>2-500mL plastic</u>	<u>NaOH</u>
<u>Total Pb</u>	<u>1-500 mL plastic</u>	<u>HNO₃</u>

Specimen

ANAL

NOTES AND OBSERVATIONS:

2' from stream. Noted smell of Naphth in stream area

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GROUNDWATER SAMPLING RECORD

PROJECT: Mill River PROJECT NO.: _____

CITY/STATE: NJ/NY

SAMPLING PERSONNEL: RC

DATE: 12/21/03 WEATHER: Cloudy, showers 8

SAMPLE DESIGNATION: 400-1 SAMPLING SEQUENCE No. 6

PURGE METHOD: BAILER / PERISTALTIC PUMP / OTHER _____

SAMPLE METHOD: BAILER / PERISTALTIC PUMP / OTHER _____

WELL DATA

MEASURING POINT: Top of PVC / Curb box / Protective pipe / Other: _____

Vertical distance from measuring point to ground surface: 2" above / below grade

WELL DIAMETER: 2" DEPTH TO WATER: 13.20 TOTAL DEPTH: 18.00

STANDING WATER(ft): _____ ONE VOLUME = (gal): _____

CONDITION OF WELL: Good / unlocked / standing water in annulus / other: _____

RECHARGE RATE: Slow / Moderate / Fast _____

WATER DATA

APPEARANCE: Clear / cloudy / silty / sheen / floating product / other: _____

ODOR: None / Petroleum / Other (describe): Napthalene

Time	<u>4</u>	<u>405</u>	<u>410</u>	<u>415</u>	<u>420</u>	<u>425</u>	<u>5</u>
Depth to water	<u>13.20</u>	<u>13.25</u>	<u>13.25</u>	<u>13.25</u>	<u>13.25</u>	<u>13.27</u>	<u>5</u>
Cum. purge volume	<u>—</u>	<u>44L</u>	<u>16L</u>	<u>2L</u>	<u>2.5</u>	<u>3L</u>	<u>A</u>
pH (S.U.)	<u>7.01</u>	<u>7.03</u>	<u>6.98</u>	<u>6.98</u>	<u>7.01</u>	<u>7.02</u>	<u>A</u>
Cond'y (umho/cm)	<u>1691</u>	<u>1685</u>	<u>1683</u>	<u>1678</u>	<u>1651</u>	<u>1635</u>	<u>M</u>
Temp (°C)	<u>16.3</u>	<u>16.1</u>	<u>15.8</u>	<u>15.5</u>	<u>15.9</u>	<u>15.8</u>	<u>P</u>
Turbidity	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>P</u>
Dissolved O ₂ (mg/l)	<u>1.73</u>	<u>1.00</u>	<u>0.66</u>	<u>0.30</u>	<u>0.41</u>	<u>0.45</u>	<u>L</u>
Other/comments:					<u>turned</u>		<u>E</u>

SAMPLE BOTTLES:

ANALYSIS	BOTTLES (number & type)	PRESERVATIVE (type & amount)
<u>Total Pb</u>	<u>1-500mL plastic</u>	<u>HNO₃</u>
<u>Total org Pb, TEL</u>		
<u>Total EPA cyanide</u>	<u>2-500mL plastic</u>	<u>NaOH</u>

NOTES AND OBSERVATIONS:

* Sediment noted in samples. Pump was running relatively high due to hose constraints, may account for sediment.

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ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

GROUNDWATER SAMPLING RECORD

PROJECT: Mill River PROJECT NO.: _____
CITY/STATE: Noho
SAMPLING PERSONNEL: RC
DATE: 12/4/03 WEATHER: Cloudy
SAMPLE DESIGNATION: 2W9 SAMPLING SEQUENCE No. 1
PURGE METHOD: BAILER / PERISTALTIC PUMP / OTHER
SAMPLE METHOD: BAILER / PERISTALTIC PUMP / OTHER

WELL DATA

MEASURING POINT: Top of PVC / Curb box / Protective pipe / Other:
Vertical distance from measuring point to ground surface: 3 above below grade
WELL DIAMETER: 2 DEPTH TO WATER: 4.7 TOTAL DEPTH: 10.9
STANDING WATER(ft): ~6 ONE VOLUME = (gal):
CONDITION OF WELL: Good / unlocked / standing water in annulus / other:
RECHARGE RATE: Slow / Moderate / Fast

WATER DATA

Purged approx. 5 gal / 30L
APPEARANCE: Clear / cloudy / silty / sheen / floating product / other: muddy
ODOR: None / Petroleum / Other (describe):

Time							
Depth to water							
Cum. purge volume							
pH (S.U.)							
Cond'y (umho/cm)							
Temp (°C)							
Turbidity							1.9
Dissolved O ₂ (mg/l)							
Other/comments:							

SAMPLE BOTTLES:

ANALYSIS	BOTTLES (number & type)	PRESERVATIVE (type&amount)
NO SAMPLING - PURGE / DEVELOP ONLY TO REMOVE SILT		

NOTES AND OBSERVATIONS:

V. muddy. Slow recharge. Wouldn't be purged more except for daylight constraints. Could hear bailer rattling in bottom of well.

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GROUNDWATER SAMPLING RECORD

PROJECT: Mill River PROJECT NO.: _____

CITY/STATE: Noho NC

SAMPLING PERSONNEL: RC

DATE: 12/4/03 WEATHER: Cloudy, 30s

SAMPLE DESIGNATION: 3W2 SAMPLING SEQUENCE No. 2

PURGE METHOD: BAILER / PERISTALTIC PUMP / OTHER _____

SAMPLE METHOD: BAILER / PERISTALTIC PUMP / OTHER _____

WELL DATA

MEASURING POINT: Top of: PVC / Curb box / Protective pipe / Other: _____

Vertical distance from measuring point to ground surface: _____ above / below grade

WELL DIAMETER: _____ DEPTH TO WATER: 11.42 TOTAL DEPTH: -19

STANDING WATER(ft): _____ ONE VOLUME = (gal): _____

CONDITION OF WELL: Good / unlocked / standing water in annulus / other: _____

RECHARGE RATE: Slow / Moderate / Fast _____

WATER DATA

APPEARANCE: Clear / cloudy / silty / sheen / floating product / other: _____

ODOR: None / Petroleum / Other (describe): Napthalene

Time							
Depth to water							
Cum. purge volume							
pH (S.U.)							
Cond'y (umho/cm)							
Temp (°C)							
Turbidity							
Dissolved O ₂ (mg/l)							
Other/comments:							

SAMPLE BOTTLES:

ANALYSIS	BOTTLES (number & type)	PRESERVATIVE (type&amount)
<u>NO SAMPLES - SILT REMOVAL ONLY</u>		

NOTES AND OBSERVATIONS:

Very silty after few bails.

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GROUNDWATER SAMPLING RECORD

PROJECT: Mill River PROJECT NO.: _____
CITY/STATE: Yoho
SAMPLING PERSONNEL: RC
DATE: 12/1/03 WEATHER: Cloudy / Snow Flurry, 30°
SAMPLE DESIGNATION: 4W1 SAMPLING SEQUENCE No. 3
PURGE METHOD: BAILER / PERISTALTIC PUMP / OTHER _____
SAMPLE METHOD: BAILER / PERISTALTIC PUMP / OTHER _____

WELL DATA

MEASURING POINT: Top of PVC / Curb box / Protective pipe / Other: _____
Vertical distance from measuring point to ground surface: _____ above / below grade
WELL DIAMETER: 2 DEPTH TO WATER: 12.7 TOTAL DEPTH: 18.6
STANDING WATER(ft): 6 ONE VOLUME = (gal): _____
CONDITION OF WELL: Good / unlocked / standing water in annulus / other: _____
RECHARGE RATE: Slow / Moderate / Fast

WATER DATA

APPEARANCE: Purged roughly 2 10 gal (2 buckets), 60 bails/L
Clear / cloudy / silty / sheen / floating product / other: muddy
ODOR: None / Petroleum / Other (describe): Naphthalene (mothballs)

Time							
Depth to water							
Cum. purge volume							
pH (S.U.)							
Cond'y (umho/cm)							
Temp (°C)							
Turbidity							
Dissolved O ₂ (mg/l)							
Other/comments:							

SAMPLE BOTTLES:

ANALYSIS	BOTTLES (number & type)	PRESERVATIVE (type&amount)
<u>NO SAMPLES - SIFT REMOVAL ONLY</u>		

NOTES AND OBSERVATIONS:

heavy sediment after first couple bails. Naphthalene smell.

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GROUNDWATER SAMPLING RECORD

PROJECT: Mill River **PROJECT NO.:** 285-03-01
CITY/STATE: Northampton, MA
SAMPLING PERSONNEL: RC
DATE: 12/18/03 **WEATHER:** Cloudy, 40's

SAMPLE DESIGNATION: 2W9 **SAMPLING SEQUENCE No.** 1083
PURGE METHOD: BAILER / PERISTALTIC PUMP / OTHER _____
SAMPLE METHOD: BAILER / PERISTALTIC PUMP / OTHER _____

WELL DATA

MEASURING POINT: Top of PVC / Curb box / Protective pipe / Other: _____
Vertical distance from measuring point to ground surface: ~3 (snow) above / below grade
WELL DIAMETER: 2 **DEPTH TO WATER:** 4.02 **TOTAL DEPTH:** 10.80
STANDING WATER(ft): 6.78 **ONE VOLUME = (gal):** _____
CONDITION OF WELL: Good / unlocked / standing water in annulus / other: _____
RECHARGE RATE: Slow / Moderate / Fast _____

WATER DATA

APPEARANCE: Clear / cloudy / silty / sheen / floating product / other: slightly silty
ODOR: None / Petroleum / Other (describe): _____

Time	1015	1020	1030	1035			
Depth to water	4.02	4.02	4.05	4.05			
Cum. purge volume				3gal			
pH (S.U.)	7.34	7.04	6.93	6.88			
Cond'y (umho/cm)	307	417	473	493			
Temp (°C)	6.3	6.7	7.0	6.9			
Turbidity	53.8	35.9	27.9	25.4			
Dissolved O ₂ (mg/l)	3.70	2.80	2.61	2.64			
Other/comments:							

SAMPLE BOTTLES:

ANALYSIS	BOTTLES (number & type)	PRESERVATIVE (type&amount)
Total Pb	6 500 mL plastic	# Nitric
	2 1-L Hg-filled to spec	
	1 0.45L filtered	Amo + us

NOTES AND OBSERVATIONS:

Not as silty as in past. Cut + replaced lock.

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GROUNDWATER SAMPLING RECORD

PROJECT: Mill River **PROJECT NO.:** 285-03-01
CITY/STATE: Noho MA
SAMPLING PERSONNEL: RC
DATE: 12/18/03 **WEATHER:** PC 40's

SAMPLE DESIGNATION: 3W2 **SAMPLING SEQUENCE No.** 2873
PURGE METHOD: BAILER / PERISTALTIC PUMP / OTHER _____
SAMPLE METHOD: BAILER / PERISTALTIC PUMP / OTHER _____

WELL DATA

MEASURING POINT: Top of PVC / Curb box / Protective pipe / Other: _____
Vertical distance from measuring point to ground surface: ~2" (see old logs) above / below grade
WELL DIAMETER: 2" **DEPTH TO WATER:** 11.32 **TOTAL DEPTH:** ~19
STANDING WATER(ft): 7.08 **ONE VOLUME = (gal):** _____
CONDITION OF WELL: Good / unlocked / standing water in annulus / other: _____
RECHARGE RATE: Slow / Moderate / Fast _____

WATER DATA

APPEARANCE: Clear / cloudy / silty / sheen / floating product / other: _____
ODOR: None / Petroleum / Other (describe): slight naphthalene (mothball)

Time	1230	1235	1240	1245			
Depth to water	11.32	11.34	11.34	11.35			
Cum. purge volume		1 gal		2 gal			
pH (S.U.)	6.94	6.93	6.93	6.93			
Cond'y (umho/cm)	1153	1165	1161	1161			
Temp (°C)	9.5	9.7	9.8	9.8			
Turbidity	56.9	49.6	41.2	39.9			
Dissolved O ₂ (mg/l)	2.82	2.77	2.34	2.18			
Other/comments:							

SAMPLE BOTTLES:

ANALYSIS	BOTTLES (number & type)	PRESERVATIVE (type&amount)
Total Pb	6- 500 ml plastic	Nitric
	1- 1.6 ug filter / to: Spectrum	AmRO + US.
	1- 0.45 um filter /	

NOTES AND OBSERVATIONS:

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GROUNDWATER SAMPLING RECORD

PROJECT: Mill River **PROJECT NO.:** 285-03-01
CITY/STATE: Ncho MA
SAMPLING PERSONNEL: RC
DATE: 12/18/03 **WEATHER:** 40's PC

SAMPLE DESIGNATION: 4W1 **SAMPLING SEQUENCE No.** 3073
PURGE METHOD: BAILER / PERISTALTIC PUMP / OTHER
SAMPLE METHOD: BAILER / PERISTALTIC PUMP / OTHER

WELL DATA

MEASURING POINT: Top of PVC / Curb box / Protective pipe / Other:
Vertical distance from measuring point to ground surface: ~2' above / below grade
WELL DIAMETER: 2" **DEPTH TO WATER:** 11.03 **TOTAL DEPTH:** 18.57
STANDING WATER(ft): 7.54 **ONE VOLUME = (gal):**
CONDITION OF WELL: Good / unlocked / standing water in annulus / other:
RECHARGE RATE: Slow / Moderate / Fast

WATER DATA

APPEARANCE: Clear / cloudy / silty / sheen / floating product / other:
ODOR: None / Petroleum / Other (describe): slight naphthalene

Time	210	215	220	225			
Depth to water	11.03	11.03	11.04	11.05			
Cum. purge volume		1 gal		2 gal			
pH (S.U.)	7.15	7.14	7.13	7.11			
Cond'y (umho/cm)	1348 1/2	1347	1343	1308			
Temp (°C)	8.5	8.7	8.8	9.0			
Turbidity	296	258	219	236			
Dissolved O ₂ (mg/l)	6.20	4.85	4.59	4.11			
Other/comments:							

SAMPLE BOTTLES:

ANALYSIS	BOTTLES (number & type)	PRESERVATIVE (type&amount)
Total Pb	6 - 500mL plastic	nitric
	1 - 1.6 um field filter	each to Spectrum & Ann + us
	1 - 0.45 um " "	

NOTES AND OBSERVATIONS:

More sediment than other wells

APPENDIX F
HUNTLEY ASSOCIATES SURVEY PLANS
(TOO LARGE TO SCAN)